he was told to misrepresent that fact and, thus, was forced to resign from examining those cases "for moral and ethical reasons."

As further revealed by Examiner Langel, and confirmed by two other Examiners, "allowance is not an option" in any pending BlackLight application according to official PTO policy. Under that arbitrary and capricious policy, the anonymous group of individuals, i.e. "Secret Committee," responsible for directing the named Examiner's actions in this case has knowingly violated well-established patent laws and procedures in presuming the utility of Applicant's novel hydrogen technology to be *per se* incredible as an excuse for its failure to properly consider and evaluate the scientific evidence of record amassed by Applicant at great expense. [See, e.g., MPEP § 2107, pp. 2100-31 ("A conclusion that an asserted utility is incredible can be reached only after the Office has evaluated both the assertion of the applicant regarding utility and any evidentiary basis of that assertion. The [Examiner] should be particularly careful not to start with a presumption that an asserted utility is, *per se*, "incredible" and then proceed to base a rejection under 35 U.S.C. 101 on that presumption.")]

Following Examiner Langel's resignation from examining BlackLight's cases, Applicant was informed that all of those cases would be consolidated under the authority of a new examiner, which was about the time Dr. Bernard Eng-Kie Souw first began making an appearance as the Committee's most prominent and outspoken member. Indeed, Examiner Souw has drafted numerous lengthy appendices totaling hundreds of pages and his views of Applicant's novel hydrogen technology have found their way into virtually every rejection and argument of record in all of Applicant's pending cases. Those views, however, not only lack credibility on the merits, but also, more disturbingly, reflect an extreme bias due to a genuine conflict of interest involving Dr. Souw's ownership of, and work as the lead scientist for, a competing company (BMS Enterprise) while examining Applicant's cases. Consequently, the Committee's rejections in all of BlackLight's cases, including this one, which have adopted Dr. Souw's biased and erroneous views, are fatally defective and should be immediately withdrawn to allow these cases to issue.

In furtherance of its "allowance is not an option" policy, the Committee has also manufactured new, and often conflicting, patentability standards that have been used to

improperly discount or wholly ignore Applicant's scientific data evidencing the existence of lower-energy hydrogen. For instance, the Committee has improperly imposed standards without legal basis requiring that Applicant publish his scientific evidence in peer-reviewed journal articles to establish its credibility and that Applicant's theory of operation for his novel hydrogen technology find "support [or acceptance] in the scientific community." Applicant has complied with these contrived standards by submitting over 65 technical articles evidencing the lower-energy states of hydrogen, which have been peer-reviewed by highly qualified PhD's scientists and published in esteemed scientific journals. Yet even that evidence, which the Committee has admitted is entitled to "the credibility that peer-reviewed articles have," is rejected as *per se* incredible because it supposedly "detract[s] from the central issue that the hydrino does not theoretically exist" and that "all of applicant's data cannot prove what is not theoretically possible."

Unable to cite legitimate scientific evidence to counter the extensive credible evidence published in Applicant's peer-reviewed journal articles, the Committee has adopted the fraudulent analysis published in an article by Dr. Andreas Rathke and other fictitious "evidence" in a transparent effort to elevate outdated and flawed quantum theory to the status of "physical law," to make it seem as though the existence of lower-energy hydrogen predicted by Applicant is "incredible." [See *infra.*] Even the Committee's conflicted lead Examiner, BMS President Souw, has admitted, however, that quantum theory "needs improvement" and that the existence of lower-energy hydrogen is not impossible. [*See infra; and see, e.g.,* the Committee's September 29, 2005 Office Action filed in U.S. App'n Ser. No. 09/669,877; Souw Appendix at p. 3 attached August 24, 2004 Office Action filed in U.S. App'n Ser. No. 08/467,051.] Yet, despite these and other embarrassing facts that have come to light, the Committee continues to rely upon the fraud of Dr. Rathke and the biased views of BMS President Souw to avoid fairly considering Applicant's experimental evidence that lower-energy hydrogen does in fact exist.

In view of these and other reasons to be explained, the rejection of claims 102-205 under 35 U.S.C. § 101 and 112, second paragraph, as lacking utility and enablement is respectfully traversed. Applicant respectfully submits that the

Committee has not met its burden of raising a *prima facie* case of inoperability for the many reasons of record and, therefore, the rejection should be withdrawn on that basis alone. Furthermore, Applicant has disclosed substantial experimental evidence in the present disclosure, prior submissions, and submissions filed herewith that fully rebut any *prima facie* case of inoperability the Committee might have raised. Applicant responds more fully to the Committee's comments, discusses the experimental evidence of record, and summarizes the improper prosecution procedures used by the Committee in the following paragraphs. For these additional reasons, the Section 101 rejection should be withdrawn.

Applicant has filed Rule 132 Declarations certifying his submitted experimental evidence, which further rebuts the Committee's unjustified utility and enablement rejections of the claimed invention. This evidence, which the Committee required Applicant to make public by submitting it to scientific journals for publication, conclusively confirms the formation of lower-energy hydrogen through practice of Applicant's novel hydrogen chemistry. To this day, the Committee has failed to properly consider the numerous Rule 132 Declarations previously filed by Applicant in violation of its own rules, as outlined in MPEP § 716:

> Evidence traversing rejections must be considered by the examiner whenever present. All entered affidavits, declarations, and other evidence traversing rejections are acknowledged and commented upon by the examiner in the next succeeding action. ... Where the evidence is insufficient to overcome the rejection, the examiner must specifically explain why the evidence is insufficient. General statements such "the declaration lacks technical validity" or "the evidence is not commensurate with the scope of the claims" without an explanation supporting such findings are insufficient. [Emphasis added.]

The Committee does not even mention, let alone consider, most of the certified experimental evidence identified in Applicant's Rule 132 Declarations that was submitted to overcome the rejections of record, which evidence is categorized and summarized below.

Lower-Energy Hydrogen Experimental Data

With this latest submission, Applicant now has over 100 articles and books of record in this case, as reflected in the "List of References" set forth below. These articles detail studies that experimentally confirm a novel reaction of atomic hydrogen, which produces hydrogen in fractional quantum states that are at lower energies than the traditional "ground" ($n = 1$) state, a chemically generated or assisted plasma (rt-plasma), and novel hydride compounds, including:

extreme ultraviolet (EUV) spectroscopy,[1]
characteristic emission from catalysis and the hydride ion products,[2]
lower-energy hydrogen emission,[3]
plasma formation,[4]
Balmer α line broadening,[5]
population inversion of hydrogen lines,[6]
elevated electron temperature,[7]
anomalous plasma afterglow duration,[8]
power generation,[9]
excessive light emission,[10] and
analysis of chemical compounds.[11]

In addition, Applicant has shown that direct plasma to electric power conversion is possible using this novel hydrogen chemistry.[12]

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[1] Ref. Nos. 11-16, 20, 24, 27-29, 31-36, 39, 42-43, 46-47, 50-52, 54-55, 57, 59, 63, 65-68, 70-76, 78-79, 81, 83, 85, 86, 89, 91-93, 95-96, 98, 101, 104, 108-109, 110-112. A complete list of Reference Nos. is given below.
[2] Ref. Nos. 24, 27, 32, 39, 42, 46, 51-52, 55, 57, 68, 72-73, 81, 89, 91, 108
[3] Ref. Nos. 14, 28-29, 33-36, 50, 63, 67, 70-71, 73, 75-76, 78-79, 86-87, 90, 92, 93, 98, 101, 104, 110-112
[4] Ref. Nos. 11-13, 15-16, 20, 24, 27, 32, 39, 42, 46-47, 51-52, 54-55, 57, 72, 81, 89, 91-93, 108-109
[5] Ref. Nos. 16, 20, 30, 33-37, 39, 42-43, 49, 51-52, 54-55, 57, 63-65, 68-69, 71-74, 81-85, 88-89, 91, 92, 93, 95-97, 105, 108-109, 114
[6] Ref. Nos. 39, 46, 51, 54, 55, 57, 59, 65-66, 68, 74, 83, 85, 89, 91
[7] Ref. Nos. 34-37, 43, 49, 63, 67, 73
[8] Ref. Nos. 12-13, 47, 81
[9] Ref. Nos. 30-31, 33, 35-36, 39, 43, 50, 63, 71-73, 76-77, 81, 84, 89, 92, 93, 98, 101, 104, 108, 110-112
[10] Ref. Nos. 11, 16, 20, 23, 31, 37, 43, 52, 72, 109
[11] Ref. Nos. 6-10, 19, 25, 38, 41, 44-45, 60-62, 64, 69, 75, 81-82, 87-88, 90, 92, 93, 94, 98, 100, 101, 104, 108, 110-112
[12] Ref. Nos. 18, 26, 40, 48, 56, 68

A summary of Applicant's experimental data confirming the existence of lower-energy hydrogen is set forth below:

1.) the observation of intense extreme ultraviolet (EUV) emission at low temperatures (e.g. $\approx 10^3\ K$) from atomic hydrogen and only those atomized elements or gaseous ions which provide a net enthalpy of reaction of approximately $m \cdot 27.2\ eV$ via the ionization of t electrons to a continuum energy level where t and m are each an integer (e.g. K and Cs atoms and Rb^+ and Sr^+ ions ionize at integer multiples of the potential energy of atomic hydrogen and caused emission; whereas, the chemically similar atoms, Na, Mg, and Ba, do not ionize at integer multiples of the potential energy of atomic hydrogen and caused no emission),[13]

2.) the observation of novel EUV emission lines from microwave and glow discharges of helium with 2% hydrogen with energies of $q \cdot 13.6\ eV$ where $q = 1,2,3,4,6,7,8,9,11,12$ or these lines inelastically scattered by helium atoms in the excitation of $He\ (1s^2)$ to $He\ (1s^1 2p^1)$ that were identified as hydrogen transitions to electronic energy levels below the "ground" state corresponding to fractional quantum numbers,[14]

3.) the observation of novel EUV emission lines from microwave and glow discharges of helium with 2% hydrogen at $44.2\ nm$ and $40.5\ nm$ with energies of $q \cdot 13.6 + \left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right) X 13.6\ eV$ where $q = 2$ and $n_f = 2,4$ $n_i = \infty$ that corresponded to multipole coupling to give two-photon emission from a continuum excited state atom and an atom undergoing fractional Rydberg state transition,[15]

4.) the identification of transitions of atomic hydrogen to lower energy levels corresponding to lower-energy hydrogen atoms in the extreme ultraviolet emission spectrum from interstellar medium and the sun,[16]

5.) the observation that the novel EUV series of lines with energies of $q \cdot 13.6\ eV$ was observed with an Evenson microwave cell, only the peak corresponding to $q = 2$

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[13] Ref. Nos. 11-13, 15-16, 20, 24, 27, 32, 39, 42, 46-47, 51-52, 54-55, 57, 72, 81, 89, 91-93, 108-109
[14] Ref. Nos. 28, 33-36, 50, 63, 67, 71, 73, 75-76, 78, 86-87, 90
[15] Ref. Nos. 36, 71, 73
[16] Ref. Nos. 1, 5, 17, 28-29

was observed with an RF cell, and none of the peaks were observed with a glow discharge cell,[17]

6.) the observation that in a comparison of Evenson, McCarroll, cylindrical, and Beenakker microwave cavity plasmas, the novel EUV series of lines with energies of $q \cdot 13.6\, eV$ was only observed for Evenson-cavity helium-hydrogen plasmas,[18]

7.) the EUV spectroscopic observation of lines for a hydrogen-K catalyst plasma by the Institut für Niedertemperatur-Plasmaphysik e.V. that could be assigned to transitions of atomic hydrogen to lower energy levels corresponding to fractional principal quantum numbers and the emission from the excitation of the corresponding hydride ions,[19]

8.) the recent analysis of mobility and spectroscopy data of individual electrons in liquid helium which shows direct experimental confirmation that electrons may have fractional principal quantum energy levels,[20]

9.) the observation of novel EUV emission lines from microwave discharges of argon or helium with 10% hydrogen that matched those predicted for the reaction $H(1/4)+H^{+} \rightarrow H_2(1/4)^{+}$ having an energy spacing of 2^2 times the transition-state vibrational energy of H_2^{+} with the series ending on the bond energy of $H_2(1/4)^{+}$,[21]

10.) the result that the novel vibrational series for the reaction $H(1/4)+H^{+} \rightarrow H_2(1/4)^{+}$ was only observed for catalyst plasmas of helium, neon, and argon mixed with hydrogen, but not with noncatalyst xenon or krypton mixed plasmas,[22]

11.) the observation that based on the intensities of the peaks, the catalyst and the plasma source dependence of the reaction rate to form $H_2(1/4)^{+}$ is Ar^{+} > He^{+} > Ne^{+} and microwave > glow discharge >> RF, respectively,[23]

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[17] Ref. Nos. 71, 73
[18] Ref. No. 76
[19] Ref. No. 14
[20] Ref. Nos. 17, 53
[21] Ref. Nos. 29, 70, 73, 79, 92, 93, 98, 101, 104
[22] Ref. Nos. 29, 70, 73, 79, 92, 93, 101
[23] Ref. No. 70

12.) the observation that the microwave plasma source dependence of the reaction rate to form $H_2(1/4)^+$ is Evenson microwave > McCarroll, cylindrical, Beenakker,[24]

13.) the observation of a series of vibration-rotational bands in the 60-67 nm region, a high-energy region for which vibration-rotational spectra are ordinarily unknown, emitted from low-pressure helium-hydrogen (99/1%) microwave plasmas that matched the predicted energy spacing of the vibrational energy of H_2 about the bond energy of $H_2(1/2)$ corresponding to the reaction $2H(1/2) \rightarrow H_2(1/2)$,[25]

14.) the observation of EUV plasma emission spectra in the region $60\ nm$ to $100\ nm$ that matched the predicted emission lines $E_{D\,H_2}$ due to the reaction $2H(1/2) \rightarrow H_2(1/2)$ with vibronic coupling at energies of $E_{D+vib} = 17.913 \pm \left(\frac{\upsilon^*}{3}\right) 0.515902\ eV$ to longer wavelengths for $\upsilon^* = 2$ to $\upsilon^* = 32$ and to shorter wavelengths for $\upsilon^* = 1$ to $\upsilon^* = 16$ to within the spectrometer resolution of about $\pm 0.05\%$,[26]

15.) the observation that in addition to members of the series of novel emission lines with energies of $q \cdot 13.6\ eV$ or $E_{D+vib} = 17.913 \pm \left(\frac{\upsilon^*}{3}\right) 0.515902\ eV$ an additional intense peak was observed from a scaled-up Evenson cell at $41.6\ nm$ with an energy of $29.81\ eV$ that matched $q \cdot 13.6\ eV$ with $q = 4$ less $24.58741\ eV$ corresponding to inelastic scattering of these photons by helium atoms due to ionization of He to He^+,[27]

16.) the observation that in a comparison of Evenson, McCarroll, cylindrical, and Beenakker microwave cavity plasmas, the novel series of spectral lines due to the reaction $2H(1/2) \rightarrow H_2(1/2)$ with vibronic coupling at energies of $E_{D+vib} = 17.913 \pm \left(\frac{\upsilon^*}{3}\right) 0.515902\ eV$ was only observed for Evenson-cavity helium-hydrogen and neon-hydrogen plasmas,[28]

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[24] Ref. No. 79
[25] Ref. No. 99
[26] Ref. Nos. 50, 75-76, 78, 86-87, 90
[27] Ref. No. 86
[28] Ref. No. 76

17.) the observation by gas chromatography that hydrogen was consumed by the helium-hydrogen plasmas which showed the novel EUV series of lines with energies of $q \cdot 13.6\ eV$, the novel series of spectral lines due to the reaction $2H(1/2) \rightarrow H_2(1/2)$ with vibronic coupling at energies of $E_{D+vib} = 17.913 \pm \left(\frac{\upsilon^*}{3}\right) 0.515902\ eV$, extraordinary H Balmer line broadening corresponding to $180 - 210\ eV$, and excess power of 21.9 W in 3 cm^3,[29]

18.) the observation of the dominant He^+ emission and an intensification of the plasma emission observed when He^+ was present with atomic hydrogen demonstrated the role of He^+ as a catalyst, [30]

19.) the observation of continuum state emission of Cs^{2+} and Ar^{2+} at $53.3\ nm$ and $45.6\ nm$, respectively, with the absence of the other corresponding Rydberg series of lines from these species which confirmed the resonant nonradiative energy transfer of $27.2\ eV$ from atomic hydrogen to the either Cs or Ar^+ catalyst,[31]

20.) the spectroscopic observation of the predicted hydride ion $H^-(1/2)$ of hydrogen catalysis by either Cs or Ar^+ catalyst at $407\ nm$ corresponding to its predicted binding energy of $3.05\ eV$,[32]

21.) the observation of characteristic emission from K^{3+} which confirmed the resonant nonradiative energy transfer of $3 \cdot 27.2\ eV$ from atomic hydrogen to atomic K,[33]

22.) the spectroscopic observation of the predicted $H^-(1/4)$ ion of hydrogen catalysis by K catalyst at $110\ nm$ corresponding to its predicted binding energy of $11.2\ eV$,[34]

23.) the observation of characteristic emission from Rb^{2+} which confirmed the resonant nonradiative energy transfer of $27.2\ eV$ from atomic hydrogen to Rb^+,[35]

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[29] Ref. No. 76
[30] Ref. Nos. 36, 73
[31] Ref. Nos. 24, 39, 51, 54-55, 57, 91
[32] Ref. No. 24
[33] Ref. Nos. 27, 39, 42, 46, 51, 54-55, 57, 81, 89, 91
[34] Ref. Nos. 81, 42, 27

24.) the spectroscopic observation of the predicted $H^-(1/2)$ ion of hydrogen catalysis by Rb^+ catalyst at 407 nm corresponding to its predicted binding energy of 3.05 eV,[36]

25.) the observation of $H^-(1/2)$, the hydride ion catalyst product of K^+ / K^+ or Rb^+, at its predicted binding energy of 3.0468 eV by high resolution visible spectroscopy as a continuum threshold at 4068.2 Å and a series of structured peaks separated from the binding energy by an integer multiple of the fine structure of $H(1/2)$ starting at 4071 Å that matched predicted free-free transitions,[37]

26.) the observation that the high resolution visible K^+ / K^+ or $Rb^+ - H_2$ plasma emission spectra in the region of 3995 to 4060 Å matched the predicted bound-free hyperfine structure lines E_{HF} of $H^-(1/2)$ calculated from the electron g factor as $E_{HF} = j^2 3.00213\, X\, 10^{-5} + 3.0563\, eV$ (j is an integer) for $j = 1$ to $j = 39$ (3.0563 eV to 3.1012 eV—the hydride binding energy peak plus one and five times the spin-pairing energy, respectively) to within a 1 part per 10^4,[38]

27.) Rb^+ or $2K^+$ catalysts formed a plasma having strong VUV emission with a stationary inverted Lyman population with an overpopulation sufficient for lasing, and emission from $H^-(1/2)$ was observed at 4071 Å corresponding to its predicted binding energy of 3.0468 eV with the fine structure and its predicted bound-free hyperfine structure lines $E_{HF} = j^2 3.00213\, X\, 10^{-5} + 3.0563\, eV$ (j is an integer) that matched for $j = 1$ to $j = 37$ to within a 1 part per 10^4,[39]

28.) the observation of stationary inverted H Balmer and Lyman populations from a low pressure water-vapor microwave discharge plasma with an overpopulation sufficient for lasing at wavelengths over a wide range from micron to blue wherein molecular oxygen served as the catalyst as supported by O^{2+} emission and H Balmer line broadening of 55 eV compared to 1 eV for hydrogen alone,[40]

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[35] Ref. Nos. 32, 39, 42, 46, 51, 54-55, 57, 81, 89, 91
[36] Ref. No. 32
[37] Ref. Nos. 39, 42, 46, 57, 81, 89, 91
[38] Ref. Nos. 39, 42, 46, 57, 81, 89, 91
[39] Ref. Nos. 39, 42, 46, 51, 54, 55, 57, 81, 89, 91
[40] Ref. Nos. 59, 65-66, 68, 74, 83, 85

29.) the observation of H Balmer line broadening of 55 eV compared to 1 eV for hydrogen alone at distances up to 5 cm from the coupler,[41]

30.) the observation that with a microwave input power of $9\ W \cdot cm^{-3}$, a collisional radiative model showed that the hydrogen excited state population distribution was consistent with an $n = 1 \rightarrow 5,6$ pumping power of an unprecedented $200\ W \cdot cm^{-3}$ permissive of gas laser efficiencies orders of magnitude those of conventional visible gas lasers and direct generation of electrical power using photovoltaic conversion of the spontaneous or stimulated water vapor plasma emission,[42]

31.) the observation of stimulation of the stationary inverted H Balmer population from a low pressure water-vapor microwave discharge plasma by back illumination with an infrared source that showed depopulation of the $n = 5$ state,[43]

32.) the observation of stationary inverted H Balmer and Lyman populations from a low pressure water-vapor microwave discharge plasma with an overpopulation sufficient for lasing was observed for Evenson microwave plasmas, but not for RF or discharge plasmas,[44]

33.) the observation of stationary inverted H Balmer and Lyman populations from a low pressure water-vapor microwave discharge plasma with an overpopulation sufficient for lasing that was dependent on the microwave plasma source with the highest inversion from Evenson microwave plasmas,[45]

34.) the observation of stationary inverted H Balmer and Lyman populations from a low pressure water-vapor microwave discharge plasma with an overpopulation sufficient for lasing that was dependent on the pressure of the Evenson microwave plasma,[46]

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[41] Ref. No. 74
[42] Ref. Nos. 68, 83, 85
[43] Ref. Nos. 59, 65, 68, 85
[44] Ref. Nos. 59, 65-66, 68, 73, 83, 85
[45] Ref. No. 83
[46] Ref. Nos. 59, 68, 73, 83, 85

35.) the observation of stationary inverted H Balmer populations from a low pressure water-vapor microwave discharge plasma with an overpopulation sufficient for lasing at distances up to 5 cm from the coupler,[47]

36.) the observation that the requirement for the natural hydrogen-oxygen stoichiometry of the Evenson water plasma was stringent in that a deviation by over 2% excess of either gas caused a reversal of the H inversion in water vapor plasmas,[48]

37.) the observation of a typical slow H population for a water-vapor plasma maintained in a GEC-type cell that was independent of time, and a new phenomenon, an extraordinary fast population that increased from zero to a significant portion of the Balmer α emission with time under no-flow conditions wherein the peak width and energy increased with time up to a 0.7 nm half-width corresponding to an average hydrogen atom energy of 200 eV,[49]

38.) the observation of a substantial fast H population (~20% at 40 eV) for a water-vapor plasmas maintained in a GEC-type cell that was independent of position including regions were the electric field was orders of magnitude to low to explain the extraordinarily high Doppler energies,[50]

39.) the observation of fast H population (40-50 eV) for He/H_2 (95/5%), Ar/H_2 (95/5%), and H_2 plasmas maintained in a GEC-type cell that was independent of position including regions were the electric field was orders of magnitude to low to explain the extraordinarily high Doppler energies,[51]

40.) the observation of the features of excessive H broadening that can not be explained by field-acceleration models such as an isotropic effect (broadening is independent of position in the cell or observation direction relative to the applied-field direction, selective H broadening, lack of a requirement for a divertor or reflector, time dependence, lack of an applied-field or pressure dependence over a broad range, and

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[47] Ref. No. 74
[48] Ref. Nos. 59, 68, 83, 85
[49] Ref. No. 95
[50] Ref. No. 96
[51] Ref. Nos. 92, 93, 97, 105

the observation that only particular hydrogen-mixed plasmas show the extraordinary broadening,[52]

41.) the observation by the Institut für Niedertemperatur-Plasmaphysik e.V. of an anomalous plasma and plasma afterglow duration formed with hydrogen-potassium mixtures,[53]

42.) the observation of anomalous afterglow durations of plasmas formed by catalysts providing a net enthalpy of reaction within thermal energies of $m \cdot 27.28\ eV$,[54]

43.) the formation of a chemically generated hydrogen plasma with the observation of Lyman series in the EUV that represents an energy release about 10 times that of hydrogen combustion which is greater than that of any possible known chemical reaction,[55]

44.) the observation of line emission by the Institut für Niedertemperatur-Plasmaphysik e.V. with a 4° grazing incidence EUV spectrometer that was 100 times more energetic than the combustion of hydrogen,[56]

45.) the excessive increase in the Lyman emission upon the addition of helium or argon catalyst to a hydrogen plasma,[57]

46.) the observation of the characteristic emission from Sr^+ and Sr^{3+} that confirmed the resonant nonradiative energy transfer of $2 \cdot 27.2\ eV$ from atomic hydrogen to Sr^+,[58]

47.) the observation of anomalous plasmas formed with Sr and Ar^+ catalysts at 1% of the theoretical or prior known voltage requirement with a light output per unit power input up to 8600 times that of the control standard light source,[59]

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[52] Ref. No. 114
[53] Ref. Nos. 13, 47, 81
[54] Ref. Nos. 12, 13, 47, 81
[55] Ref. Nos. 11-13, 15-16, 20, 24, 27, 32, 39, 42, 46-47, 51-52, 54-55, 57, 72, 81, 89, 91, 109
[56] Ref. No. 14
[57] Ref. Nos. 20, 31, 37, 43
[58] Ref. Nos. 16, 52
[59] Ref. Nos. 11, 16, 20, 23, 52, 72

48.) the observation that the optically measured output power of gas cells for power supplied to the glow discharge increased by over two orders of magnitude depending on the presence of less than 1% partial pressure of certain catalysts in hydrogen gas or argon-hydrogen gas mixtures, and an excess thermal balance of 42 W was measured for the 97% argon and 3% hydrogen mixture versus argon plasma alone,[60]

49.) the observation that glow discharge plasmas of the catalyst-hydrogen mixtures of strontium-hydrogen, helium-hydrogen, argon-hydrogen, strontium-helium-hydrogen, and strontium-argon-hydrogen showed significant Balmer α line broadening corresponding to an average hydrogen atom temperature of $25-45\ eV$; whereas, plasmas of the noncatalyst-hydrogen mixtures of pure hydrogen, krypton-hydrogen, xenon-hydrogen, and magnesium-hydrogen showed no excessive broadening corresponding to an average hydrogen atom temperature of $\approx 3\ eV$,[61]

50.) the observation that microwave helium-hydrogen and argon-hydrogen plasmas having catalyst Ar^+ or He^+ showed extraordinary Balmer α line broadening due to hydrogen catalysis corresponding to an average hydrogen atom temperature of $110-130\ eV$ and $180-210\ eV$, respectively; whereas, plasmas of pure hydrogen, neon-hydrogen, krypton-hydrogen, and xenon-hydrogen showed no excessive broadening corresponding to an average hydrogen atom temperature of $\approx 3\ eV$,[62]

51.) the observation that microwave helium-hydrogen and argon-hydrogen plasmas showed average electron temperatures that were high, $30,500 \pm 5\%\ K$ and $13,700 \pm 5\%\ K$, respectively; whereas, the corresponding temperatures of helium and argon alone were only $7400 \pm 5\%\ K$ and $5700 \pm 5\%\ K$, respectively,[63]

52.) the observation of significant Balmer α line broadening of $17,\ 9,\ 11,\ 14,\ and\ 24\ eV$ from rt-plasmas of incandescently heated hydrogen with K^+ / K^+, Rb^+, cesium, strontium, and strontium with Ar^+ catalysts, respectively, wherein the results could not be explained by Stark or thermal broadening or electric field

[60] Ref. No. 22
[61] Ref. Nos. 16, 20, 30, 52, 72
[62] Ref. Nos. 33-37, 43, 49, 60, 63-64, 69, 71, 73-74, 82, 84, 88
[63] Ref. Nos. 34-37, 43, 49, 63, 67, 73

acceleration of charged species since the measured field of the incandescent heater was extremely weak, 1 V/cm, corresponding to a broadening of much less than $1\ eV$,[64]

53.) calorimetric measurement of excess power of 20 mW/cc on rt-plasmas formed by heating hydrogen with K^+ / K^+ and Ar^+ as catalysts,[65]

54.) the observation of an energy balance of $\Delta H = -17{,}925\ kcal/mole\ KNO_3$, about 300 times that expected for the most energetic known chemistry of KNO_3, and $-3585\ kcal/mole\ H_2$, over 60 times the hypothetical maximum enthalpy of $-57.8\ kcal/mole\ H_2$ due to combustion of hydrogen with atmospheric oxygen, assuming the maximum possible H_2 inventory when KNO_3 and Raney nickel were used as a source of K catalyst and atomic hydrogen, respectively, to produce the corresponding exothermic reaction,[66]

55.) the observation of rt-plasmas formed with strontium and argon at 1% of the theoretical or prior known voltage requirement with a light output per unit power input up to 8600 times that of the control standard light source as well as an excess power of 20 mW/cm from rt-plasmas formed by Ar^+ as the catalyst in an incandescent-filament cell,[67]

56.) the Calvet calorimetry measurement of an energy balance of over $-151{,}000\ kJ/mole\ H_2$ with the addition of 3% hydrogen to a plasma of argon having the catalyst Ar^+ compared to the enthalpy of combustion of hydrogen of $-241.8\ kJ/mole\ H_2$; whereas, under identical conditions no change in the Calvet voltage was observed when hydrogen was added to a plasma of noncatalyst xenon,[68]

57.) the observation that the power output exceeded the power supplied to hydrogen glow discharge plasmas by 35-184 W depending on the presence of catalysts from helium or argon and less than 1% partial pressure of strontium metal in noble gas-

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[64] Ref. Nos. 39, 42, 46, 51-52, 54-55, 57, 72, 81, 89, 91, 108-109
[65] Ref. Nos. 39, 81, 89, 108
[66] Ref. No. 111
[67] Ref. Nos. 72, 109
[68] Ref. No. 31

hydrogen mixtures; whereas, the chemically similar noncatalyst krypton had no effect on the power balance,[69]

58.) the observation that with the addition of 3% flowing hydrogen to an argon microwave plasma with a constant input power of $40\ W$, the gas temperature increased from 400°C to over 750°C; whereas, the 400°C temperature of a xenon plasma run under identical conditions was essentially unchanged with the addition of hydrogen,[70]

59.) observations of power such as that where the addition of 10% hydrogen to a helium microwave plasma maintained with a constant microwave input power of $40\ W$, the thermal output power was measured to be at least $280\ W$ corresponding to a reactor temperature rise from room temperature to 1200°C within 150 seconds, a power density of $28\ MW/m^3$, and an energy balance of at least $-4\ X10^5\ kJ/mole\ H_2$ compared to the enthalpy of combustion of hydrogen of $-241.8\ kJ/mole\ H_2$,[71]

60.) the observation of $306 \pm 5\ W$ of excess power generated in $45\ cm^3$ by a compound-hollow-cathode-glow discharge of a neon-hydrogen (99.5/0.5%) mixture corresponding to a power density of $6.8\ MW/m^3$ and an energy balance of at least $-1\ X10^6\ kJ/mole\ H_2$ compared to the enthalpy of combustion of hydrogen of $-241.8\ kJ/mole\ H_2$,[72]

61.) the observation that for an input of 37.7 W, the total plasma power of the neon-hydrogen plasma measured by water bath calorimetry was 60.7 W corresponding to 23.0 W of excess power in 3 cm^3,[73]

62.) the observation of intense He^+ emission and a total plasma power of a helium-hydrogen plasma measured by water bath calorimetry of 30.0 W for an input of 8.1 W, corresponding to 21.9 W of excess power in 3 cm^3 wherein the excess power density and energy balance were high, $7.3\ W/cm^3$ and $-2.9\ X10^4\ kJ/mole\ H_2$, respectively,[74]

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[69] Ref. No. 30
[70] Ref. No. 43
[71] Ref. Nos. 34, 35
[72] Ref. Nos. 50, 78
[73] Ref. No. 76
[74] Ref. Nos. 36, 63, 71, 73

63.) in the comparison of helium-hydrogen plasmas sources, the observation that i.) with an input power of 24.8± 1 W, the total plasma power of the Evenson microwave helium-hydrogen plasma measured by water bath calorimetry was 49.1 ± 1 W corresponding to 24.3 ± 1 W of excess power in 3 cm^3 corresponding to a high excess power density and energy balance of 8.1 W/cm^3 and over $-3\,X\,10^4$ $kJ/mole\ H_2$, respectively, ii.) with an input of 500 W, a total power of 623 W was generated in a 45 cm^3 compound-hollow-cathode-glow discharge, iii.) less than 10% excess power was observed from inductively coupled RF helium-hydrogen plasmas, and iv.) no measurable heat was observed from MKS/Astex microwave helium-hydrogen plasmas that corresponded to the absence of H Balmer line broadening, [75]

64.) the observation of energy balances of helium-hydrogen microwave plasmas of over 100 times the combustion of hydrogen and power densities greater than $10\ W/cm^3$ measured by water bath calorimetry,[76]

65.) at the load matching condition of 600 Ω, the direct plasmadynamic conversion (PDC) of open circuit voltages of 11.5 V and ~200 mW of electrical power with a 0.125 in diameter by 3/4 in long plasmadynamic electrode and a 140 G applied field corresponding to an extracted power density of ~1.61 W/cm^3 and an efficiency of ~18.8%,[77]

66.) at the load matching condition of 250 Ω, the direct plasmadynamic conversion (PDC) of open circuit voltages of 21.8 V and 1.87 W of electrical power with a 0.125 in diameter by 3/4 in long plasmadynamic electrode and a 140 G applied field corresponding to an extracted power density of 3.6 W/cm^3 and an efficiency of 42%,[78]

67.) the projection that the generation of electricity using magnetohydrodynamic (MHD) conversion of the plasma particle energy of small to mid-size chemically assisted microwave or glow discharge plasma (ca-plasma) power sources in the range of a few

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[75] Ref. Nos. 84, 98, 104
[76] Ref. Nos. 34-36, 50, 63, 71, 73, 76-78, 84, 92, 93, 101, 112
[77] Ref. No. 48
[78] Ref. No. 56

hundred Watts to several 10's of kW for microdistributed commercial applications appears feasible at 50% efficiency or better with a simple compact design,[79]

68.) the differential scanning calorimetry (DSC) measurement of minimum heats of formation of KHI by the catalytic reaction of K with atomic hydrogen and KI that were over $-2000\ kJ/mole\ H_2$ compared to the enthalpy of combustion of hydrogen of $-241.8\ kJ/mole\ H_2$,[80]

69.) the isolation of novel hydrogen compounds as products of the reaction of atomic hydrogen with atoms and ions which formed an anomalous plasma as reported in the EUV studies,[81]

70.) the synthesis and identification of a novel diamond-like carbon film terminated with $CH(1/p)$ (H^*DLC) comprising high binding energy hydride ions was synthesized for the first time from solid carbon by a microwave plasma reaction of a mixture of 10-30% hydrogen and 90-70% helium wherein He^+ served as a catalyst with atomic hydrogen to form the highly stable hydride ions and an energetic plasma,[82]

71.) the synthesis of polycrystalline diamond films on silicon substrates without diamond seeding by a very low power microwave plasma reaction of a mixture of helium-hydrogen-methane (48.2/48.2/3.6%) wherein He^+ served as a catalyst with atomic hydrogen to form an energetic plasma with an average hydrogen atom temperature of $180-210\ eV$ versus $\approx 3\ eV$ for pure hydrogen and bombardment of the carbon surface by highly energetic hydrogen formed by the catalysis reaction may play a role in the formation of diamond,[83]

72.) the synthesis of polycrystalline diamond films on silicon substrates without diamond seeding by a very low power microwave plasma reaction of a mixture of argon-hydrogen-methane (17.5/80/2.5%) wherein Ar^+ served as a catalyst with atomic hydrogen to form an energetic plasma with an average hydrogen atom temperature of $110-130\ eV$ versus $\approx 3\ eV$ for pure hydrogen and bombardment of the carbon surface

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[79] Ref. No. 40
[80] Ref. No. 25
[81] Ref. Nos. 6-10, 19, 25, 38, 41, 44-45, 60-62, 75, 81, 87, 90, 92, 93, 100, 101, 108, 110-112
[82] Ref. No. 60
[83] Ref. Nos. 64, 69, 88

by highly energetic hydrogen formed by the catalysis reaction may play a role in the formation of diamond,[84]

73.) the identification of a novel highly stable surface coating $SiH(1/p)$ by time of flight secondary ion mass spectroscopy that showed SiH^+ in the positive spectrum and H^- dominant in the negative spectrum and by X-ray photoelectron spectroscopy which showed that the H content of the SiH coatings was hydride ions, $H^-(1/4)$, $H^-(1/9)$, and $H^-(1/11)$ corresponding to peaks at 11, 43, and 55 eV, respectively, and showed that the surface was remarkably stable to air,[85]

74.) the isolation of novel inorganic hydride compounds such as $KHKHCO_3$ and KH following each of the electrolysis and plasma electrolysis of a K_2CO_3 electrolyte which comprised high binding energy hydride ions that were stable in water with their identification by methods such as (i) ToF-SIMS on $KHKHCO_3$ which showed inorganic hydride clusters $K[KHKHCO_3]_n^+$ and a negative ToF-SIMS dominated by hydride ion, (ii) X-ray photoelectron spectroscopy which showed novel peaks corresponding to high binding energy hydride ions, and (iii) ^1H nuclear magnetic resonance spectroscopy which showed upfield shifted peaks corresponding to more diamagnetic, high-binding-energy hydride ions,[86]

75.) the identification of $LiHCl$ comprising a high binding energy hydride ion by time of flight secondary ion mass spectroscopy which showed a dominant H^- in the negative ion spectrum, X-ray photoelectron spectroscopy which showed $H^-(1/4)$ as a new peak at its predicted binding energy of 11 eV, ^1H nuclear magnetic resonance spectroscopy which showed an extraordinary upfield shifted peak of -15.4 ppm corresponding to the novel hydride ion, and powder X-ray diffraction which showed novel peaks,[87]

76.) the identification of novel hydride compounds by a number of analytical methods such as (i) time of flight secondary ion mass spectroscopy which showed a dominant hydride ion in the negative ion spectrum, (ii) X-ray photoelectron spectroscopy which showed novel hydride peaks and significant shifts of the core levels of the primary

[84] Ref. Nos. 82, 88
[85] Ref. Nos. 45, 61, 100
[86] Ref. Nos. 6-7, 9, 38, 41
[87] Ref. Nos. 44, 62

elements bound to the novel hydride ions, (iii) ^1H nuclear magnetic resonance spectroscopy (NMR) which showed extraordinary upfield chemical shifts compared to the NMR of the corresponding ordinary hydrides, and (iv) thermal decomposition with analysis by gas chromatography, and mass spectroscopy which identified the compounds as hydrides,[88]

77.) the NMR identification of novel hydride compounds $MH*X$ wherein M is the alkali or alkaline earth metal, X, is a halide, and $H*$ comprises a novel high binding energy hydride ion identified by a large distinct upfield resonance,[89]

78.) the replication of the NMR results of the identification of novel hydride compounds by large distinct upfield resonances at Spectral Data Services, University of Massachusetts Amherst, University of Delaware, Grace Davison, and National Research Council of Canada,[90]

79.) the NMR identification of novel hydride compounds $MH*$ and MH_2^* wherein M is the alkali or alkaline earth metal and $H*$ comprises a novel high binding energy hydride ion identified by a large distinct upfield resonance that proves the hydride ion is different from the hydride ion of the corresponding known compound of the same composition, [91]

80.) the observation that the ^1H MAS NMR spectrum of novel compound $KH*Cl$ relative to external tetramethylsilane (TMS) showed a large distinct upfield resonance at -4.4 corresponding to an absolute resonance shift of -35.9 ppm that matched the theoretical prediction of p = 4, and the novel peak of $KH*I$ at -1.5 ppm relative to TMS corresponding to an absolute resonance shift of -33.0 ppm matched the theoretical prediction of p = 2,[92]

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[88] Ref. Nos. 6-10, 19, 25, 38, 41, 44-45, 60-62, 75, 81, 87, 90, 92, 93, 100, 108, 110-112
[89] Ref. Nos. 10, 19, 41, 44, 62, 81, 108, 110-112
[90] Ref. Nos. 19, 81, 108, 110
[91] Ref. Nos. 19, 81, 108, 110-112
[92] Ref. Nos. 81, 108, 110-112

81.) the observation that the predicted catalyst reactions, position of the upfield-shifted NMR peaks, and spectroscopic data for $H^-(1/2)$ and $H^-(1/4)$ were found to be in agreement,[93]

82.) the analysis by Infrared (FTIR) spectroscopy which eliminated any known explanation such as U centered H for the assignment of the extraordinary upfield-shifted NMR peak.[94]

83.) the isolation of fraction-principal-quantum-level molecular hydrogen $H_2(1/p)$ gas by liquefaction using an ultrahigh-vacuum, liquid nitrogen cryotrap, and the observations of novel peaks by cryogenic gas chromatography, a higher ionization energy than H_2 by mass spectroscopy, a substantial change in the EUV emission spectrum with deuterium substitution in a region where no hydrogen emission has ever been observed, and upfield shifted NMR peaks at 0.21, 2.18 and 3.47 ppm compared to that of H_2 at 4.63 ppm,[95]

84.) the observation of ^1H NMR singlet peaks upfield of H_2 with a predicted integer spacing of 0.64 ppm at 3.47, 3.02, 2.18, 1.25, 0.85, and 0.22 ppm identified as the consecutive series $H_2(1/2)$, $H_2(1/3)$, $H_2(1/4)$, $H_2(1/5)$, $H_2(1/6)$, and $H_2(1/7)$, respectively, and $H_2(1/10)$ at -1.8 ppm wherein $H_2(1/p)$ gas was isolated by liquefaction at liquid nitrogen temperature, by decomposition of compounds found to contain the corresponding hydride ions $H^-(1/p)$, and by permeation through a hollow nickel cathode,[96]

85.) the observation of excess enthalpy from a K_2CO_3 electrolytic cell of a factor of two times that of the resistive power dissipation and ^1H NMR singlet peaks upfield of H_2 with a predicted integer spacing of 0.64 ppm at 3.49, 2.17, 1.25, 0.86, and 0.21 ppm which matched the consecutive series $H_2(1/2)$, $H_2(1/4)$, $H_2(1/5)$, $H_2(1/6)$, and $H_2(1/7)$, respectively, and a higher ionizing molecular hydrogen recorded on the electrolysis gases collected in a hollow nickel cathode,[97]

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[93] Ref. Nos. 81, 108, 110-112
[94] Ref. Nos. 108, 110-112
[95] Ref. Nos. 75, 87, 90, 92, 93, 94, 101, 112
[96] Ref. Nos. 98, 101, 103-104, 112
[97] Ref. Nos. 103-104

86.) the observation of 1943 cm^{-1} and 2012 cm^{-1} peaks in the high-resolution (0.5 cm^{-1}) FTIR spectrum (490-4000 cm^{-1}) of $KH*I$ having a peak assigned to $H^-(1/4)$ that matched the predicted frequencies of ortho and para-$H_2(1/4)$,[98]

87.) the observation of the 1943/2012 cm^{-1}-peak-intensity ratio of 3:1 in the high resolution (0.5 cm^{-1}) FTIR spectrum (1875-2060 cm^{-1}) of $KH*I$ which is characteristic of ortho-para hydrogen splitting wherein the ortho-para splitting of 69 cm^{-1} matched that predicted,[99]

88.) the observation of rotational lines in the 145-300 nm region from atmospheric pressure 12.5 keV electron-beam excited argon-hydrogen plasmas where the unprecedented energy spacing of 4^2 times that of hydrogen established the internuclear distance as 1/4 that of H_2 and identified $H_2(1/4)$,[100]

89.) the observation of emission from 12.5 keV-electron-beam-excited $KH*Cl$ having $H^-(1/4)$ by NMR that matched the rotational emission lines of interstitial $H_2(1/4)$ and further matched the rotational frequency of $H_2(1/4)$ observed by FTIR and by electron-beam excitation of the argon-hydrogen plasmas.[101]

The dismissal of this extensive body of experimental evidence by the Secret Committee, led by Dr. Souw, is a major disappoint, not only for its failure to fairly evaluate this evidence of lower energy states, but also for its incredible lack of understanding of the nature of Applicant's invention as it relates to the most basic scientific principles. Applicant had expected that Dr. Souw, as the founder and current president of BMS Enterprise—a company that competes in some of the same scientific fields as Applicant—would have a better grasp of the concepts underlying the technology he is examining. Or it could just be that Dr. Souw is unable to put his conflicting business interests aside and fairly evaluate a competitor's invention, along with the supporting evidence submitted therewith.

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[98] Ref. Nos. 110-112
[99] Ref. Nos. 110-112
[100] Ref. Nos. 98, 101, 104, 110-112
[101] Ref. Nos. 111-112

In either case, the erroneous arguments that populate Dr. Souw's various Office Actions and Appendices, particularly those in defense of outdated quantum theory, are untenable. Particularly disturbing is the fact that the Committee in this case has elevated Dr. Souw's distorted views of that seriously flawed theory, one that he readily admits "needs improvement," into the category of an accepted "scientific principle" upon which Applicant's invention and supporting experimental evidence is falsely proclaimed to be "incredible." This fundamental error permeates the Committee's entire analysis, which has resulted in the misguided rejections of Applicant's claims for allegedly failing to comply with the utility and enablement requirements of 35 U.S.C. §§ 101 and 112, first paragraph, respectively.

With now over 65 peer-reviewed articles in esteemed scientific journals evidencing the existence of lower energy states, along with other countless evidence, Applicant's modern quantum theory has now gained acceptance in the scientific community in accordance with one of the many new standards created by the Committee for this one Applicant. [*See infra.*] The Committee's refusal to grant Applicant a fair and expeditious hearing on that evidence, led by BMS President Souw, is a "black eye" to an agency charged with the public trust to impartially carry out its constitutional directive of promoting the progress of science.

Applicant again respectfully demands that the Committee consider and evaluate in detail all of the record evidence, which, to date, it has largely ignored. The scientific data disclosed in this extensive body of evidence was collected and peer-reviewed with great care by a group of highly qualified scientists capable of understanding every detail of Applicant's technology. The very least the Committee can do is to also carefully evaluate that data in detail, article by article, with an open mind so that Applicant is given a full and fair opportunity to present his case. If and when the Committee finally does so, Applicant believes it will find that the evidence overwhelmingly proves the existence of lower-energy hydrogen in accordance with his disclosed invention.

If, on the other hand, the Committee should find true fault with any of that data on legitimate scientific grounds—not the kind of nitpicking Applicant has seen on theoretical grounds—it should communicate as much to afford Applicant the opportunity

to respond. Such scientific give-and-take is the only way to advance the prosecution of this case.

Unfortunately, with continued prosecution of this and BlackLight's other applications, a far different pattern has emerged. The Committee continues to set arbitrary and capricious hurdles designed to avoid considering Applicant's conclusive experimental evidence and thereby block his patents from issuing. Each time Applicant clears one of these hurdles, the Committee merely raises the bar by setting new standards.

For instance, the Committee initially alleged that Applicant's disclosed hydrogen chemistry, which forms lower-energy hydrogen, related to the controversial concepts of "perpetual motion" and "cold fusion." When Applicant exposed those allegations as utter nonsense, the Committee quickly abandoned its indefensible position, arguing instead that BlackLight's lower-energy hydrogen technology violated unidentified laws of physics. Then, to cover up its failure to identify even a single physical law that was supposedly being violated, the Committee improperly placed the burden on Applicant to do so: "in order to establish enablement, applicant bears the burden of providing the accepted scientific laws wrong or incomplete." [See page 6 of Office Action dated July 16, 2001 in U.S. App'n Ser. No. 08/467,911.] When Applicant showed that just the opposite is true—that Applicant's novel hydrogen chemistry complies with all physical laws, even at atomic and sub-atomic levels—the Committee once again backpedaled.[102]

The Committee then advanced vague assertions that the concept of lower-energy hydrogen violated "ideas" of modern science and that this technology contradicted "beliefs" in the scientific community. These assertions later evolved into a new standard requiring Applicant to show that his theory of operation has "support [or acceptance] in the scientific community." See, for example, the August 25, 2005 Office Action issued in U.S. App'n Ser. No. 09/181,180:

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[102] The Committee later resurrected this abandoned argument in a last-ditch effort to brand Applicant's lower-energy hydrogen technology a scientific impossibility, relying on an internet posting to claim that the ground state of an electron is a basic physical law that cannot be violated. As Applicant shows herein below, that argument is also wholly without merit and, in fact, contradicts even the biased views of Examiner/BMS President Souw, who was assigned to oversee examination of all of Applicant's cases based on his alleged technical expertise. [See *infra*.]

> The claims are directed to [a] device for generating heat based upon hydrogen catalysis. In this device a source of hydrogen and a vapor catalysis are sent to a reaction chamber wherein heat is generated because, by applicant's theory, the energy level of atomic hydrogen is reduced from the stable level of N=1 to lower levels such as N=½ , ¼ etc to form atoms known as "hydrinos". In this reduction, large amounts of energy are said to be produced. The examiner considers that this description would not enable the skilled artisan to make and use the invention. In the first place, there is no support in the scientific community for applicant's theory of operation.
>
> * * *
>
> Applicant's arguments filed May 25, 2005 have been fully considered but they are not persuasive. Applicant has submitted many non-patent literature documents in the IDS filed 5/25/05, but it is not clear which if any of these documents indicate that the theory upon [which] applicant's invention is based has been accepted in the scientific community. [Office Action at 2-3 (emphasis added).]

This standard, like so many others promoted by the Committee in this case, is erroneous and should be withdrawn for two reasons: first, the level of support (or acceptance) in the scientific community is not the proper standard for ascertaining whether an applicant has satisfied the enablement or utitlity requirements under Sections 112 and 101, respectively; and second, even under that erroneous standard, Applicant has clearly met it by showing that his claimed invention does have support in the scientific community.

Regarding the Committee's misplaced reliance on its newly minted "support in the scientific community" standard to deny Applicant patent protection for his pioneering technology, that standard makes absolutely no sense and thus, not surprisingly, has no legal basis. Until recent rule changes, the PTO kept patent applications in strict confidence. Typically, an invention disclosure would be made public only after claims were found to be allowable, whereupon the application would then be published as an issued patent. So it defies common sense to claim that applicants are required to show that their inventions have support in the scientific community, when there was no requirement until recently that a patent applicant even disclose his invention to the public until such time as a patent issues.

The irony here is that, according to the Committee's nonsensical standard, the more pioneering the invention, the more difficult it will necessarily be to show "support in the scientific community." Yet these pioneering inventions are the ones most deserving of patent protection.

This requirement that Applicant show support in the scientific community was no doubt the motivation behind the Committee's demand that Applicant publish his scientific evidence of lower energy states of hydrogen in peer-reviewed journal articles. Despite the Committee's failure to cite any legal authority for that evidentiary standard, Applicant nonetheless complied with it. As previously stated, Applicant now has over 65 peer-reviewed articles published in respected scientific journals regarding the operation of his lower-energy hydrogen technology, thus demonstrating considerable support in the scientific community.[103] Thus, by the Committee's own admission, this accomplishment establishes Applicant's satisfaction of the enablement and utility requirements under 35 U.S.C. §§ 112 and 101.

Indeed, the Committee initially touted the credibility of peer-reviewed journal articles in scientific debate. Of course, that was when it was criticizing Applicant's scientific evidence of lower-energy hydrogen predicted by his theory, prior to publication of that evidence, as "not having the credibility that peer-reviewed articles have." [See, for example, page 5 of the Committee's May 19, 2004 Office Action in U.S. App'n Ser. No. 09/352,693.] Now that Applicant's evidence has been widely published in peer-reviewed articles appearing in highly esteemed scientific journals, the Committee has the audacity to claim that his theory lacks support in the scientific community.

Consistent with its "allowance is not an option" policy, the Committee takes this extreme position even farther by claiming that Applicant's real-world evidence that lower-energy hydrogen actually exists "detract[s] from the central issue that the hydrino does not theoretically exist" and that "all of applicant's data cannot prove what is not theoretically possible." [See, for example, May 12, 2005 Advisory Action in U.S. App'n

[103] As explained more fully below, Applicant has complied with the Committee's required showing of support in the scientific community despite attempts by his competitors to undermine that support by disparaging Applicant and his technology. The extent to which members of the Committee, including BMS President Souw, have knowledge of, or involvement in, such activities, that information is highly relevant to the issue of whether Applicant's lower-energy hydrogen technology has support in the scientific community and, therefore, must be disclosed.

Ser. No. 09/669,877 at page 2 (emphasis added).] Thus, even when Applicant complies with the Committee's "support in the scientific community" standard by submitting scientific evidence that has been peer-reviewed by highly qualified PhD's scientists and accepted for publication in esteemed scientific journals, since, according to the Committee, that credible evidence is rejected because it supposedly "detracts" under a different patentability standard that improperly presumes his invention to be *per se* incredible.

Out of the multitude of unsupportable and conflicting patentability standards that the Committee has put forward over the years, this one truly stands out as perhaps the most outrageous. Applicant has spent enormous amounts of effort and money complying with the PTO's unlawful requirement that he publicly disclose in peer-reviewed publications confidential data generated by Applicant and independent third parties to prove the existence of lower-energy hydrogen. The only way to now settle the debate on whether lower-energy hydrogen actually exists is to properly evaluate that real-world evidence. For the Committee to now assert that those efforts were for naught, since Applicant's evidence "detract[s] from the central issue that the hydrino does not theoretically exist," turns science on its head and is an embarrassment to a government agency charged with "promot[ing] the Progress of Science and useful Arts." [See U.S. Constitution, Art. I, Sect. 8, Clause 8.]

The Committee's ridiculous position that it need not seriously analyze Applicant's scientific data because the existence of lower-energy hydrogen is incredible based on an alleged theoretical impossibility—at least according to its misguided view of quantum mechanics—further violates well-established patent laws and procedures. Indeed, the PTO's own procedures outlined in MPEP § 2107, p. 2100-31 require that the Examiner not start from the premise that an invention is "incredible," by mandating that:

> [The Examiner] should not begin an evaluation of utility by assuming that an asserted utility is likely to be false, based on the technical field of the invention or for other general reasons. . . A conclusion that an asserted utility is incredible can be reached only after the Office has evaluated both the assertion of the applicant regarding utility and any evidentiary basis of that assertion. The [Examiner] should be particularly careful not to start with a presumption that an asserted utility is, *per se*, "incredible" and then proceed to base a rejection under 35 U.S.C. 101 on that presumption.

Amazingly, when Applicant first criticized the Committee's error in refusing to consider Applicant's supporting evidence, under the presumption that the utility of his novel hydrogen technology is *per se* incredible, the Committee vehemently denied that it had ever taken the position that the existence of lower-energy hydrogen was impossible. Even the Committee's most prominent member, Examiner/BMS President Souw, has offered the same denial:

> Contrary to Applicant's allegation on pg. 13, 1st full paragraph, lines 2-4, the PTO's view is not at all that the existence of lower-energy hydrogen were [sic] impossible, but instead, that (a) Applicant's invention is not supported by any experimental fact or evidence, and (b) the underlying theory (i.e., GUT/CQM) fails to support the invention, because it contains too many flaws. [See, for instance, Souw Appendix at p. 3 attached to the Committee's Final Office Action mailed August 24, 2004 in Applicant's U.S. App'n Ser. No. 08/467,051 (emphasis added).]

The Committee, however, has contradicted itself by now readily admitting that it has dismissed the totality of Applicant's submitted scientific evidence based on the false presumption that "all of applicant's data cannot prove what is not theoretically possible." Applicant is hard pressed to imagine an approach to patent examination any more arbitrary and capricious than that.

In yet another blatant contradiction, the Committee resurrected its previously abandoned argument claiming that Applicant's novel hydrogen technology violates physical laws. When pressed to identify even a single law that is violated, the Committee continuously failed to do so. Apparently feeling the pressure to at least attempt to back up its claims, the Committee now relies upon the Krieg "reference"—actually a non-peer reviewed web page posted on the internet[104]—to allege that the "ground state of an electron of a hydrogen atom" is just such a law:

> Applicant argues (page 20) that the "committee" has failed to identify "even a single physical law" which has been violated. In paper no. 40, referring to the Krieg reference, the Office has shown that Applicant's theory violates the physical law concerning the ground state of an electron

[104] Applicant has rebutted the Krieg web page arguments supposedly showing that the ground state of hydrogen is a physical law, without an effective response from the Committee. [*See, e.g.*, pp. 140-42 of Applicant's Response filed January 17, 2006 in U.S. App'n Ser. No. 09/008,947.]

> of a hydrogen atom. On page 3 of his article (actually a webpage), Krieg uses an energy balance (potential + kinetic = total), the basic laws of electricity and magnetism, the uncertainty principle, and ordinary calculus to prove that the minimum energy level is the normally accepted "ground state." [See page 3 of the July 18, 2005 Final Office Action issued in U.S. App'n Ser. No. 09/008,947.]

The Committee's allegations are akin to the beliefs held by those who originally thought the earth was flat and that the sun revolved around the earth before breakthrough scientific evidence proved them wrong. The Committee is now in the embarrassing position of dismissing Applicant's scientific evidence demonstrating that the hydrogen atom can be made stable below the ground state because accomplishment of that feat supposedly violates a physical law forbidding such lower energy states. The Committee's circular reasoning, however, does not reflect well on a government agency charged with promoting the progress of science. If complying with physical laws is indeed the standard the Committee is applying, then surely it must condemn SQM, with all of its anomalies that have no basis in reality, and embrace Applicant's CQM, which is premised on compliance with physical laws even at the atomic level.

That would be true but for the fact that the Committee is not constrained by the same standards it unfairly applies against Applicant. Thus, according to the Committee:

> Applicant's tentative recitation of E.H. Lieb's article is flawed and also misleading, since Lieb does not mention anything about hydrino. The fact that SQM contains parts that need improvement is scientifically acceptable, since (a) no physical theory is all encompassing, and (b) there would otherwise be no progress in science. [Page 18 of Souw Appendix A.]

This latest double standard further exposes the weakness of the Committee's case. When it comes to flawed, outdated quantum theory, upon which the Committee relies so heavily to support its position, the fact that it needs improvement is marginalized as "scientifically acceptable." Yet, the Committee requires that Applicant's modern and more advanced theory that accurately predicts the existence of lower energy states be perfect in every detail—which it is—before it will deem Applicant's experimental evidence credible enough to be worthy of consideration. This

clear double standard make a mockery of the Committee's examination of Applicant's hydrogen technology.

Put another way: How can the Committee on the one hand admit that outdated quantum theory "needs improvement," yet on the other, seriously claim that this flawed theory rises to the level of a sound "scientific principle" that serves as the basis for asserting that the existence of lower energy states of hydrogen predicted by Applicant's modern theory is "incredible"? This unsustainable, flawed position sounds the death knell for the Committee's rejections in all of Applicant's cases, which rejections should therefore be withdrawn immediately.

Furthermore, the Committee's assertion that Applicant's novel technology based on lower energy states of hydrogen violates physical law and thus can't possibly work even contradicts the express position taken by its conflicted lead Examiner, BMS President Souw. As noted above, when Applicant previously criticized the Committee for its failure to fairly consider Applicant's scientific evidence on the basis that the existence of lower-energy hydrogen was impossible, Dr. Souw took exception to that criticism claiming that "[t]he PTO's view is not at all that the existence of lower-energy hydrogen were [sic] impossible." [See, for instance, Dr. Souw's Appendix at p. 3 attached to the Committee's August 24, 2004 Office Action filed in Applicant's U.S. App'n Ser. No. 08/467,051.] Clearly then, if Dr. Souw does not consider the existence of lower-energy hydrogen impossible, such lower energy states cannot be in violation of any physical law, much less the one now identified by the Committee as "the physical law concerning the ground state of an electron of a hydrogen atom." In now taking a contrary position, the Committee has unwittingly undermined the credibility of Dr. Souw and calls into question other views expressed by him.

The only consistency found throughout this myriad of contrived vague and double standards—and often no standards at all—is the Committee's use of each to excuse it from fairly considering and evaluating Applicant's scientific evidence that lower-energy hydrogen does indeed exist. The Committee prefers instead to engage in a theoretical debate to the exclusion of that evidence, pitting its outdated quantum theory, with all of

its far-fetched and disproved predictions, against Applicant's modern theory of classical quantum mechanics that correctly predicts the formation of lower-energy hydrogen.[105]

Applicant has willingly engaged the Committee in this theoretical debate, and will continue to do so if necessary, even though the patent laws do not require that an inventor understand the precise theoretical basis for why his invention works. All the law requires is that he disclose his invention in sufficient detail to enable one of ordinary skill in the art how to practice it. Applicant has done precisely that and the Committee has failed in its burden to show otherwise.

Of course, the debate over these competing theories can go on indefinitely without resolution, which may be the Committee's strategy. Engaging in that intellectual exercise, however, will not—indeed cannot—definitively settle the question of whether practicing Applicant's disclosed hydrogen chemistry results in the formation of lower-energy hydrogen. Like any good theoretical debate, this one can only be tested and ultimately settled by fully and fairly evaluating the unprecedented amount of real-world experimental evidence Applicant has submitted conclusively confirming the lower energy states of hydrogen. Applicant has expended tens of millions of dollars amassing this experimental evidence. The least the Committee can do is properly consider it.

In the few isolated instances in which the Committee has addressed Applicant's evidence, it offers far-fetched reasons for dismissing it without a fair hearing, again demonstrating its arbitrary and capricious approach to examination of his cases. One prominent example occurred early on during the February 21, 2001 Interview held in all of BlackLight's then-pending lower-energy hydrogen applications, which was led by Examiner Vasudevan Jagannathan—one of the few Committee members Applicant has been able to successfully identify. At that interview, Applicant had a brief opportunity to present some of his scientific evidence, including spectroscopic data that is extraordinarily reliable in identifying chemical compositions. Such data amounts to a "chemical fingerprint" that cannot be seriously disputed. Despite the conclusiveness of

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[105] Applicant's modern theory, which applies classical laws to the electron, not only solves everything Quantum Mechanics and Quantum Electrodynamics can do better using physical laws, but also solves problems that Quantum cannot do, such as solving for the masses of fundamental particles and predicting the acceleration of the expansion of the Universe. Applicant's modern theory can further solve, for example, all atomic and molecular orbital current density functions, the corresponding energies, the corresponding bond energies, and the bond parameters for all molecules.

that evidence, Examiner Jagannathan dismissed it out of hand as nothing more than "a bunch of squiggly lines."

To put the absurdity of that comment in context, the PTO rationalized its withdrawal of BlackLight's five allowed patent applications, in part, by citing a January 12, 2000 article written by Dr. Robert Park, spokesman for one of Applicant's main competitors, the American Physical Society (APS). [March 22, 2000 Decision at page 7 (Attachment G).] In that article, Dr. Park made the following startling statements:

> The energy states of atoms are studied through their atomic spectra—light emitted at very specific wavelengths when electrons make a jump from one energy level to another. The exact prediction of the hydrogen spectrum was one of the first great triumphs of quantum theory; it is the platform on which our entire understanding of atomic physics is built. The theory accounts perfectly for every spectral line.
>
> There is no line corresponding to a "hydrino" state. Indeed there is no credible evidence at all to support Mills' claim. [See Attachment J at 4 (emphasis added).]

The incredible irony here—one that cannot be easily overlooked—highlights once again the extreme arbitrary and capricious approach the Committee has taken in examining this and other BlackLight applications. There is no question that the vitriol espoused by Dr. Park in his cited *Post* article was, at least, partially responsible for the PTO's suspect "eleventh-hour" withdrawal of the five allowed BlackLight applications from issue. And yet, despite the fact that the very article the PTO relies upon to deny Applicant his patents recognizes that spectroscopic data is extraordinarily reliable—indeed, the "platform on which our entire understanding of atomic physics is built"—the Committee nonetheless continues to cavalierly ignore or dismiss that same data when submitted by Applicant.

Out of exasperation, Applicant queried Examiner Jagannathan during the February 21, 2001 Interview as to what type and quality of evidence would convince him that lower-energy hydrogen exists. In response, the Examiner required that Applicant publicly divulge confidential information by publishing his experimental evidence in peer-reviewed scientific journals for that evidence to be considered reliable. As detailed above, Applicant has more than met this newly created "publication" standard for

considering his experimental evidence by submitting over 100 scientific papers for publication, even though the PTO's rules and procedures impose no such requirement. So far, over 65 of these papers have completed and passed the peer-review process conducted by highly qualified Ph.D. referees.

Applicant's experimental evidence has been extensively peer-reviewed and published in the following esteemed journals:

Applied Physics Letters
Chemistry of Materials
Electrochimica Acta
European Journal of Physics D
European Physical Journal: Applied Physics
Fusion Technology Journal of New Materials for Electrochemical Systems
IEEE Transactions on Plasma Science
International Journal of Hydrogen Energy
Journal of Applied Physics[106]
Journal of Material Science
Journal of Molecular Structure
Journal of Optical Materials
Journal of Plasma Physics
Journal of Physics D: Applied Physics
Journal of Quantitative Spectroscopy and Radiative Transfer
Journal of New Materials for Electrochemical Systems
New Journal of Physics
Physics Essays
Plasma Sources Science and Technology
Solar Energy Materials & Solar Cells
Thermochimica Acta
Vibrational Spectroscopy

Additionally, Applicant's experimental evidence has been submitted for peer-review and publication in the following esteemed journals:

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[106] Applicant notes that the *Journal of Applied Physics* is the very same journal cited by the Committee as credible evidence that Dr. Souw, one of its premier members, is supposedly qualified to evaluate Applicant's novel hydrogen technology. [See *infra*.]

Acta Physica Polonica A

AIAA Journal

Anuoles de la Fondation Louis de Broglie

Brazilian Journal of Physics

Canadian Journal of Physics

Central European Journal of Physics

Chemical Engineering Science

Contributions to Plasma Physics

Current Applied Physics

Europhysics Letters

Fizika A

Foundations of Science

Journal of Applied Spectroscopy

Journal of Mathematical Physics

Journal of Materials Research

Journal of Physical Chemistry A

Journal of Physical Chemistry B

Journal of Vacuum Science & Technology A

Materials Characterization

Materials Chemistry and Physics

New Journal of Chemistry

Physical Review B

Physica Scripta

Spectrochimica Acta Part B: Atomic Spectroscopy

Thin Solid Films

Vacuum

Once again, however, the Secret Committee has raised the bar to patentability by arbitrarily and capriciously ignoring this vast body of evidence that it required Applicant to submit. The Committee apparently believes that its anonymous members are better qualified than the numerous skilled PhD's who peer-reviewed and approved the contents of Applicant's articles confirming the existence of lower-energy hydrogen.

The PTO's mishandling of the experimental evidence of record in this case is but one of several improper actions that have adversely effected Applicant's patent rights. Others include:

(1) illegally withdrawing or threatening to withdraw other copending BlackLight patent applications from issue, after initially allowing all claims, under highly suspicious circumstances that suggest likely interference by BlackLight's competitors;

(2) improperly examining this application by Secret Committee, effectively denying Applicant the right to confront the persons involved in that examination, to assess their qualifications and biases, and to ascertain whether those persons include BlackLight's competitors or other improper outside influences, in breach of PTO confidentiality requirements; and

(3) refusing reasonable requests by Applicant and five U.S. Senators to divulge information relating to the events that triggered the PTO's withdrawal action, and the identity of all PTO employees and non-PTO personnel involved in examining BlackLight's applications.

These improper actions bear directly upon the prosecution of BlackLight's pending applications, yet Applicant's good faith efforts to discuss and resolve these and other outstanding issues have been either ignored or rejected out of hand. One of Applicant's many overtures was communicated directly to then PTO Director James E. Rogan in a letter dated December 21, 2001, from BlackLight board member Dr. Shelby T. Brewer. Dr. Brewer received his Ph.D. in Nuclear Engineering from M.I.T. and served as Assistant Energy Secretary in the Reagan administration.[107] [See Attachment A.]

As stated in his letter, Dr. Brewer's reasons for appealing to Director Rogan were motivated not only by his fiduciary duty to protect BlackLight's interests, but also by a sincere desire to avoid unnecessary embarrassment to the PTO over these lingering issues if left unresolved. Dr. Brewer appealed for a meeting with Director Rogan in an attempt to bring some closure to this matter in a way that might mutually benefit both sides.

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[107] Other prominent Directors on BlackLight's board include: Michael H. Jordan, CEO of Electronic Data Systems, Vice Admiral Michael P. Kalleres, former Commander of the U.S. Second Fleet, General Merrill A. McPeak, former Chief of Staff of the U.S. Air Force, and Neil Moskowitz, CFO of Credit Suisse First Boston.

Despite the urgency of his plea, Dr. Brewer waited over four months before finally receiving a response to his request for a meeting. In a curt letter dated April 24, 2002, from the Director's Chief-of-Staff, Jason C. Roe, the PTO advised: "We appreciate your interest in this matter, but, unfortunately, must decline your request for a meeting due to the fact that the USPTO is not in a position to discuss the issue at the present time." [See Attachment A.] The PTO's response, however, merely begs the question: if not now, when will it be in a position to have these discussions?

This negative response, while disappointing, was hardly surprising. In refusing to meet with Applicant, the PTO continues to treat prosecution of this and BlackLight's other copending cases as an adversarial proceeding. While the PTO may believe it is justified in shrouding its untoward actions under a cloak of secrecy and remaining answerable to no one, that approach does little to preserve public confidence in the patent process. Only by openly engaging Applicant in mutually beneficial discussions of all the issues in this case can the PTO ever hope to achieve that worthy goal. Applicant therefore implores the PTO to reconsider its policies and adopt a more flexible and cooperative approach by agreeing to meet with Applicant to discuss the handling of this and other pending BlackLight applications before taking any further action.

Perhaps the PTO sees no need to modify its approach, buoyed by the Federal Circuit's June 28, 2002 Decision upholding its withdrawal action that cancelled issuance of BlackLight's allowed patent applications. [*See BlackLight Power, Inc. v. Director James E. Rogan*, 63 USPQ2d1534 (Fed. Cir. 2002) (Attachment B).] The Federal Circuit ruled, among other things, that an "emergency situation" trumped the controlling regulation requiring the PTO to determine the unpatentability of one or more claims before it withdrew the '294 application from issue so that the PTO's mere "concern" over patentability provided adequate basis for the withdrawal. That Decision, aside from the fact that it is erroneous,[108] does not even begin to resolve other issues that touch on the merits of this case.

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[108] Applicant believes that the Federal Court's opinion is erroneous due, in part, to its misreading of a concurring opinion of one Justice in a 38-year-old Supreme Court case to support its holding that this supposed "emergency situation"—a finding that was not supported by the record or even argued by the PTO—justified the PTO's withdrawing BlackLight's copending '294 application from issue on February 17, 2000, after payment of the issue fee. *See BlackLight Power* at page 7 *citing Baltimore & Ohio Railroad*

One such issue is how this alleged "emergency situation" arose in the first place, *i.e.*, how the PTO became aware of BlackLight's issued U.S. Patent No. 6,024,935 (the '935 patent) that supposedly raised "concerns" about other pending applications. That issue apparently was not important to Associate Solicitor Kevin Baer who defended the PTO's conduct by arguing to the District Court: "I would even say, Your Honor, you could imagine in our head any scenario of how we learned about it. A blimp flying over us. It doesn't matter, because what matters, Your Honor, is the decision [to withdraw] itself." [May 22, 2000 Transcript at 52 (Attachment K, Tab E).]

Judge Sullivan, however, was apparently unimpressed by those comments, noting in footnote 10 of his opinion that he was "troubled by several steps in the PTO's process" and advising the PTO to "examine its patent issuance process so that their normal operations are not compromised by such seemingly suspicious procedures." [See 109 F.Supp. 2d 44, 53-54, n.10 (Attachment L).]

While the PTO may be unconcerned how it learned of the '935 patent, Applicant considers that information critically important. If, for instance, competitors were somehow involved in events leading to the withdrawal of BlackLight's allowed applications and, perhaps, in the subsequent prosecution of those and other applications, that information would relate directly to the credibility of the rejections entered in those cases, including this one. Applicant therefore renews his request for a

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Co. v. United States, 386 U.S. 372, 421 (1964) (Brennan, J., concurring) (recognizing the importance of leaving the Interstate Commerce Commission (ICC) great flexibility to deal with emergency situations to avoid serious damage to the national transportation system, but finding no pressing need that justified the ICC's action). The Federal Circuit stretched that case way beyond the limits of Supreme Court precedent that requires government agencies to strictly follow statutory and regulatory guidelines.

Incredibly, at oral argument, the PTO did not even suggest that an emergency situation had forced it to withdraw this application from issue on February 17, 2000. To the contrary, PTO Solicitor John M. Whealan argued that no withdrawal—emergency or otherwise—occurred on that date and admitted that, if the Court found otherwise, his case would be seriously compromised. This was because, at that time, the PTO could not locate the patent file and admittedly could not have made a determination of unpatentability of one or more claims as required by the controlling regulation. *See* 37 C.F.R. § 1.131(b)(3); MPEP § 1308 (7th Ed., Rev. 1, Feb. 2000). To avoid an adverse ruling, Solicitor Whealan sought refuge outside the administrative record, suggesting for the first time that the PTO had used the wrong form in mistakenly notifying Applicant on February 17 that his application had been withdrawn. Then, again without evidentiary support, the Solicitor tried to convince a skeptical Court that Director Kepplinger, in consultation with the Examiner, had made an unpatentability determination sometime later, after Applicant had voluntarily supplied the PTO with a copy of the application—hardly an emergency situation if it were true.

full accounting of how, out of the thousands of patents the PTO issues every week, his '935 patent came to its attention, thus leading to the withdrawal of BlackLight's allowed applications.

Applicant believes that concerns over outside influences on the prosecution of his applications are fully justified. Following the PTO's withdrawal action, counsel immediately investigated the facts and circumstances surrounding that action by questioning various PTO personnel. In discussions with Director Esther Kepplinger, she admitted to counsel that the withdrawal was a reaction to perceived heat—a "firestorm" as she put it—the PTO had received from an undisclosed outside source. Director Kepplinger further indicated that the withdrawal occurred only after BlackLight's '935 patent had been brought to the attention of then-Director Q. Todd Dickinson by Gregory Aharonian, another PTO outsider well known for publicly attacking issued U.S. patents.[109]

Director Kepplinger's revelations are truly disturbing in that they describe what is essentially a newly created non-statutory reexamination procedure for opposing the issuance of patents never envisioned by Congress. *Compare* 35 U.S.C. §§ 301-307 (patent reexamination statutes).

Following the PTO's drastic withdrawal action, Applicant discovered other reliable information suggesting the likelihood of outside interference with BlackLight's patent applications and breaches of the PTO' s duty to maintain the confidentiality of those applications. Applicant initially learned that Dr. Peter Zimmerman, former Chief Scientist for the State Department, had published an Abstract of an upcoming speech to the American Physical Society (APS)—a BlackLight competitor—boasting that his Department and the Patent Office "have fought back with success" against BlackLight. [See Attachment K, Tab C.] In conversations with BlackLight's counsel, Dr. Zimmerman admitted that he had received information concerning BlackLight's applications through e-mails from Dr. Robert Park, spokesman for the APS, who told him of a contact in the

[109] See Applicant's February 28, 2000 letter to Director Kepplinger documenting telephone and personal conversations between her and Applicant's counsel regarding improper outside influence that precipitated the withdrawal of BlackLight's five allowed applications. The PTO cited this letter in its March 22, 2000 Decision affirming its withdrawal action. [See Attachment G.]

PTO referred to by Dr. Park as "Deep Throat" with access to confidential patent information. [See letter dated July 10, 2000 (Attachment K, Tab C).]

An *APS News Online* bulletin, dated August/September 2002, suggests that Dr. Park is maintaining his questionable PTO contacts, apparently with the agency's blessing:

> **APS E-Board Passes Resolution on Perpetual Motion Machines**
>
> The APS Executive Board approved a resolution at its June 2002 meeting in Annapolis, MD, affirming the fraudulent nature of claims of perpetual motion machines.
>
> The resolution was deemed necessary because of a recent increase in patent applications for such devices. Robert Park, APS Director of Public Information and author of the weekly electronic newsletter, "What's New," reported that the US Patent Office has received several patent applications for perpetual motion machines during the first six months of this year alone. [Park's 2000 book, *Voodoo Science*, devoted considerable space to the phenomenon of such devices throughout history.] The text of the APS resolution follows.
>
> The Executive Board of the American Physical Society is concerned that in this period of unprecedented scientific advance, misguided or fraudulent claims of perpetual motion machines and other sources of unlimited free energy are proliferating. Such devices directly violate the most fundamental laws of nature, laws that have guided the scientific progress that is transforming our world.
>
>

[Attachment Q (emphasis added).] Dr. Park's knowledge of the number of pending patent applications filed in the PTO directed to a particular subject matter—information that is supposedly kept confidential—raises additional questions as to his activities in interfering with the prosecution of U.S. patent applications.[110]

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[110] Not coincidently, the Committee initially attacked the operability of Applicant's invention by mischaracterizing it as a "perpetual motion machine" and, therefore, *per se* unpatentable. The Committee quickly withdrew that line of attack after Applicant showed it was completely lacking in any merit.

Of course, this should come as no surprise since Dr. Park has admitted his direct involvement in BlackLight's patent affairs, as evidenced by the September 6, 2002 issue of *What's New* he authored and published on the APS website:

> The status of BlackLight Power's intellectual property is fuzzier than ever. BLP was awarded Patent 6,024,935 for "Lower-Energy Hydrogen Methods and Structures," a process for getting hydrogen atoms into a "state below the ground state". . . . You might expect these shrunken hydrogen atoms, called "hydrinos," to have a pretty special chemistry. Do they ever! Indeed, a second patent application titled "Hydride Compounds" had been assigned a number and BLP had paid the fee. Several other patents were in the works. That's when things started heading South. Prompted by an outside inquiry (who would do such a thing?), the patent director became concerned that this hydrino stuff required the orbital electron to behave "contrary to the known laws of physics and chemistry." The Hydride Compounds application [the '294 application] was withdrawn for further review and the other patent applications were rejected. [September 6, 2002 Online Newsletter of Dr. R. Park, *What's New* (Attachment C) (emphasis added).]

Dr. Park's startling admission was confirmed two weeks later in the September 20, 2002 issue of the *Online Newsletter* published by the James Randi Educational Foundation (JREF). In it, James Randi gleefully boasted about Dr. Park's contacting the Patent Office with the express purpose of sabotaging Applicant's patent rights:

> But why, hard on the heels of re-examining other questionable patents (see three weeks ago on this page), would the Patent Office have happened upon this particular one [BlackLight's withdrawn '294 application], when there are so many in this category? The secret can be inferred from Bob Park's weekly column, where we find: "Prompted by an outside inquiry (who would do such a thing?) . . ." That rascal!
>
> The very fact that the Patent Office has paid heed to the complaints that Park, the JREF, and others have made, speaks well for rationality. Let's hope that we can look forward to many quack devices and systems being re-evaluated. Let's see a lot more of this "extraordinary action" from the Director. As for BlackLight Power, says Park, "Their long-awaited IPO may have to wait a little longer." [September 20, 2002 Online Newsletter of the JREF, *Swift* (Attachment C) (emphasis added).]

Despite all of this overwhelming incriminating evidence of improper outside interference by competitors with an administrative patent proceeding—a possible criminal offense—the PTO continues to ignore this serious matter. Indeed, the PTO tries to deflect attention away from this incriminating evidence by addressing points that

have nothing to do with Dr. Park's "Deep Throat" contacts at the PTO, or by advancing arguments that actually confirm his interference in the examination of Applicant's pending patent applications:

> Applicant has made numerous references to a Dr. Robert Park, whom he alleges to have had contact with a "Deep Throat" in the Office (page 31), and to have had "direct involvement in Blacklight's patent affairs" (page 32), "Blacklight" being the name of applicant's business. While applicant argues (page 24) that "the PTO rationalized its withdrawal of Blacklight's five allowed patent applications, in part, by citing a January 12, 2000 article written by Dr. Robert Park", citing a published article hardly constitutes contact with the author. The reference to the present applicant in the article does not mean that Dr. Park had obtained confidential information from the Office, because applicant published an edition of his book, *The Grand Unified Theory of Classical Quantum Mechanics*, in January 2000. While applicant argues (page 32) that Dr. Park knew about several of applicant's applications, the knowledge of which "is supposedly kept confidential", the Washington Post article by Dr. Park which refers to applicant's patent and a second application set to issue two weeks thereafter was published on 18 August 2000, which was three days after the publication of the U.S. District Court decision (part of Attachment K) which referred in which these applications were mentioned (page 1 thereof). Thus, both articles written by Dr. Park appear to be based on information that was already made public at the two respective times that the articles were published. No "Deep Throat" or other improper contact would have been necessary. [See, for example, the November 21, 2005 Office Action filed in App'n Ser. No. 09/110,678 at p. 5; and the December 12, 2005 Advisory Action filed in App'n Ser. No. 09/110,694 at p. 5.]

The mention of Blacklight Power in the January 12, 2000 article referenced above was never put forward by Applicant as a basis for claiming Dr. Park had a "Deep Throat" contact at the PTO. It was cited merely to show the PTO's reliance on someone who, as shown by other evidence, had an agenda to sabotage Applicant's patent applications and who boasted about having done so.

When the Committee finally gets around to addressing <u>one piece</u> of that evidence Applicant used to show Dr. Park's receipt of illicit information from the PTO, the Committee misconstrues it in a way that actually supports Applicant's position. Specifically, as cited above, the <u>September 2002</u> issue of the *APS News Online* bulletin suggests that Dr. Park has maintained his questionable contacts at the PTO well after Applicant's allowed applications had been withdrawn years earlier. Again, the APS

states in that bulletin that: "Robert Park, APS Director of Public Information and author of the weekly electronic newsletter, "What's New," reported that the PTO has received several patent applications for perpetual motion machines during the first six months of this year alone." [Emphasis added.] Based on that eye-opening disclosure, Applicant argues, and rightfully so, that Dr. Park's knowledge of information that "is supposedly kept confidential"—referring not to Applicant's previously known applications, but to the unknown applications of others—raised additional questions as to his activities involving interference with the prosecution of U.S. patent applications.

The Committee confuses that evidence, and convolutes Applicant's arguments, in asserting that "Applicant argues (page 32) that Dr. Park knew about several of applicant's applications, the knowledge of which 'is supposedly kept confidential'." [Emphasis added.] Applicant has cited other evidence of Dr. Park's knowledge of applicant's applications, which, to date, the Committee has completely ignored. The evidence the Committee refers to above, however, demonstrates Dr. Park's "insider status" at the PTO by showing he had received illicit information about other applicants' filed applications in 2002. Thus, the fact that articles were written in 2000 about Applicant's applications or that applicant's applications due to issue in 2000 were otherwise mentioned has absolutely nothing to do with Dr. Park's knowledge in 2002 of different applications filed by others that year.

Due to the Committee's obvious confusion on this point, it erroneously concludes that "both articles written by Dr. Park appear to be based on information that was already public at the two respective times that the articles were published" and "[n]o 'Deep Throat' or other contact would have been necessary." To the contrary, Applicant has presented considerable evidence that, in fact, Dr. Park has had, and continues to maintain, improper contacts at the PTO based on Dr. Park's and Dr. Zimmerman's own admissions discussed above regarding Dr. Park's knowledge of confidential PTO filings, including information pertaining to Applicant's pending patent applications. The least the Committee can do is fairly and accurately address that evidence, which it has yet to do.

In limiting its consideration to but a small fraction of that evidence, as mischaracterized above, the Committee nonetheless has at least acknowledged the

relevance and seriousness of Dr. Park's improper contacts with the PTO. In making that case for Applicant, the Committee is obliged consider and respond to all of the evidence Applicant has presented on this important issue.

Apparently, this is not the first time that Dr. Park, James Randi and PTO officials have been embroiled in a patent controversy such as this one involving improper interference with a patent proceeding. Less than a year before Applicant's five allowed applications were withdrawn from issue in February 2000, the PTO was caught up in another scandal of sorts involving the issuance of U.S. Patent Nos. 5,748,088 and 6,011,476, granted on a device that can identify the obscured location of living entities. Following issuance of the '088 patent, Dr. Park published in his *What's New* newsletter inaccurate, disparaging remarks, which were picked up by James Randi on his JREF website, concerning the operation and reliability of the claimed invention. [Attachment H] An article published May 21, 1999 in *Science Magazine* during the pendency of the '476 patent also reported on the controversy and the involvement of Sandia National Labs (SNL) in the testing of the device. [Attachment D]

SNL's involvement and the disclosure of confidential information to David Voss, the author of the *Science* article, was itself the subject of some controversy and resulted in the issuance of an internal PTO memorandum that was placed in the '476 patent file. In that memorandum, the PTO felt compelled to reiterate its policy forbidding PTO employees from making public disclosures concerning pending patent applications:

PTO MEMORANDUM FOR ALL EMPLOYEES: MEDIA CONTACT POLICY

Posted Date: 06/25/99
Removal Date: 07/06/99

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

June 22, 1999

99-42

MEMORANDUM FOR All Employees

FROM: Acting Assistant Secretary of Commerce and Acting Commissioner of Patents and Trademarks

SUBJECT: Media Contact Policy

Since a memorandum on this subject was first issued several years ago, thousands of new employees have joined the PTO. Therefore, it is a good time to reiterate PTO policy concerning employee contact with members of the media including, but not limited to, those in print, broadcast, cable, and online publications.

All requests, including telephone and e-mail, from members of the media for interviews, tours, and appearances should be directed to the Office of Public Affairs (Richard Maulsby or Brigid Quinn). Public Affairs will then determine the appropriate Office response for such requests and arrange for all interviews and any other meetings with the media. A member of the Public Affairs staff may attend interviews and meetings.

This policy applies only to contact with the media, not to interactions with customers. Any questions about media contact should be directed to the Office of Public Affairs at 305-8341.

Additionally, MPEP section 1701 and TMEP section 1801 specify that Office personnel should not comment on the validity or enforceability of any U.S. patent or trademark registration. These sections also caution employees about answering other particular inquiries concerning U.S. patents or trademark registrations. Any questions on this policy should be directed to your supervisor or to the MPEP Editor at 305-8813 for patents or to the Office of the Assistant Commissioner for Trademarks at 308-8900. [Attachment E]

Curiously, SNL is where Dr. Park previously served as head of its Surface Physics Division, leading Applicant to wonder whether SNL, or any of its sister labs, have had any similar involvement in the examination of this and other BlackLight applications. Applicant's curiosity on this point is further heightened by the fact that Examiner Bernard Souw, a former employee with Brookhaven National Labs, is a premier member of the Secret Committee who has been engaged in the examination of BlackLight's patent applications for some time now. [See, e.g., App'n Ser. No. 09/513,768.] As discussed below, Examiner Souw's activities as lead scientist for a company he owns in competition with BlackLight, while examining BlackLight's patent

applications, raises a genuine conflict of interest, thus adding further cause for concern over outside interference with Applicant's patent rights.

If, as Applicant suspects, the PTO has conferred with others having ties to the APS, like Dr. Park or Dr. Zimmerman, or to other BlackLight competitors in withdrawing or rejecting BlackLight's applications, that information would be highly relevant and thus must be disclosed. Obviously, knowing the identity and potential biases of all persons providing input or otherwise involved in rejecting BlackLight's applications, especially those with competing interests, bears directly on the credibility of those rejections. This point could not have been made more clear than the Committee's adoption of Examiner Souw's biased views in formulating its rejections in this case.

Applicant has, on numerous occasions, disclosed to PTO officials information relating to Dr. Park's undermining of BlackLight's patent rights, as relayed in Dr. Brewer's December 21, 2001 letter to then PTO Director Rogan, only to be ignored. [Attachment A; see also, for example, January 19, 2001 letter to Director Kepplinger (Attachment K).] As Dr. Brewer explained in his letter, BlackLight is obviously concerned, among other things, that the PTO may have once again breached its duty to maintain confidentiality of U.S. patent applications under 35 U.S.C. § 122, 18 U.S.C. § 2071, 37 C.F.R. § 1.14, and M.P.E.P. § 101. The PTO's curt statement that it is "not in a position to discuss the issue at the present time" does little to allay those concerns.

Dr. Brewer further expressed in his letter distress over the suspected compromise of Applicant's patent rights to his novel hydrogen chemistry by a group of physicists with a vested interest in maintaining federal funding for projects based on a competing scientific theory and concern that those physicists continue to exert improper influence over the prosecution of BlackLight's pending applications. Those suspicions are only fueled by continued PTO silence on these issues while it undercuts Applicant's patent rights based on statements of competitors like Dr. Park. For instance, in the March 22, 2000 Decision justifying its withdrawal of Applicant's allowed patent applications, the PTO relied, in part, on a *Washington Post* article written by Dr. Park only slightly more than a month prior to the withdrawal:

> While petitioner in the accompanying letter points to favorable testimonials from scientists and entrepreneurs regarding the "revolutionary

> technology" that the instant application is asserted to embody, this does not establish that either the Director, Technology Center 1700, or the Director, Special Programs Law Office, committed reversible error, nor that the Notice should be withdrawn. In contrast, mainstream newspapers have reported this same "revolutionary technology" is accompanied by controversy in the scientific community. See Baard et al., Scientists and entrepreneurs have lots of ideas about new sources of energy; some may even be practical, Wall St. J., Sept. 13, 1999, at R16; **Park, Perpetual motion; still going around, Washington Post, Jan. 12, 2000, at H3.** [March 22 Decision at 7 (Attachment G).]

Applicant is naturally skeptical that this timing was simply a coincidence. Regardless, the mere fact that the PTO would rely on any competitor to "bad-mouth" BlackLight's technology is troubling. That it relied on Dr. Park of all people, known for conducting "hatchet jobs" on new technologies that threaten federal funding for the physicists he represents, is contemptible.

The same *Washington Post* that ran Dr. Park's libelous article rebuked its less than credible author in a subsequent article confirming his reputation for engaging in what it described a "search-and-destroy mission" against inventors and scientists who seek to advance the bounds of science. [See Article dated June 25, 2000 (Attachment M).] To quote the article's exact words, "Park's anger permeates his rebuttals, which border on character assassination." [*Id.* At 1.] Noting that "thoroughness is not Park's strong suit," the article goes on to suggest that his intentions may be less than honorable:

> Park's failure to gather first-hand data is unfortunate, but his selective omissions are far more serious. In at least one case, he violated basic principles of journalism and science itself by apparently suppressing information that conflicts with his foregone conclusion. . . .
>
> Such tactics are reminiscent of the behavior of a zealous DA who is so convinced that a suspect is guilty that he feels entitled to withhold some information from the jury. [*Id.* at 1-2.]

Dr. Park's competitive motives in attacking BlackLight's novel hydrogen chemistry, and thereby undermining its patent rights, are clear, as further recognized by the *Post* article in its description of Dr. Park as "a Washington lobbyist and PR flack for

the American Physical Society." The article goes on to warn of the serious effects a rush to judgment can have without first-hand review of experimental evidence:

> This is a serious matter, since even poorly documented vitriol can jeopardize a scientist's reputation and future funding if it is disseminated with the complicity of a respected organization such as the American Physical Society. [*Id.* at 2.]

Dr. Park has admitted that there is merit to Applicant's argument that he is hostile to BlackLight, and therefore obviously biased against it, for competitive reasons. As discussed in his January 13, 2006 issue of *What's New* [Attachment C], Dr. Park explains the basis for his hostility:

> We haven't heard much about Mills and his company, BlackLight Power, since they lost a patent appeal three years ago. (WN 6 Sep 02). But with the start of the new year, Dow Jones Newswires ran a story about deep-pocket financial gurus that are backing BlackLight. A retired head of energy banking at Morgan Stanley commented that physicists are "hostile" to Mills' ideas. Bob Park, was the only physicists quoted. Sure enough, he was hostile. "Park represents an entrenched physics establishment that fears losing billions in funding and having its work discredited," Mills explained. [See http://bobpark.physics.umd.edu/WN06/wn011306.html (Emphasis added).]

Dr. Park apparently takes great pride in being the only named physicist hostile to Mills' ideas and, in doing so, he gives credence to the underlying competitive motives for this hostility ascribed to him by Dr. Mills. Having conceded his obvious bias against BlackLight, it is highly inappropriate for the Committee to continue to cite and rely on his views in rejecting Applicant's patent applications.

Incredibly, in rationalizing its withdrawal action, the PTO paid tribute to a "hatchet man" like Dr. Park, who represents a competitor intent on sabotaging BlackLight's patent rights, by citing his hostile statements against BlackLight. Yet, in explaining the issuance of BlackLight's '935 patent, the PTO publicly denigrates its entire examining corps, previously known for their careful study of experimental evidence in deciding whether to issue U.S. patents:

> [P]atent examiners do review [patent applications]. Unfortunately, patent examiners are swamped and sometimes things slip through. [Statement of Associate Solicitor Baer in *BlackLight Power, Inc. v. Q. Todd Dickinson*, May 22, 2000 Tr. at 7 (Attachment K, Tab A).]

> [E]xaminers are under tremendous pressure to produce work, and if they're going to approve [an application], they just approve it and kind of let it out the door. [May 22, 2000 Tr. at 48 (Attachment K, Tab A).]

As Dr. Brewer pointed out in his December 21, 2001 letter to Director Rogan, the PTO's outrageous public statements violate 35 U.S.C. § 282, under which statute all issued U.S. patents are presumed to be valid:

> **Presumption of validity; defenses**
>
> A patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim. The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity.

Underlying this fifty-year-old statutory presumption of validity is the premise of administrative regularity, which presumes that well-trained examiners with expertise in their respective fields properly carry out their examination duties by issuing only valid patents. See, e.g., American Hoist & Derrick Co. v. Sowa & Sons, Inc., 725 F.2d 1350, 1359 (Fed. Cir. 1984). This presumption was, in fact, confirmed by the capable work of Examiners Langel and Kalafut who, with over 50 years of experience between them, examined and allowed Applicant's '935 patent, along with BlackLight's withdrawn applications.[111]

As succinctly stated in Dr. Brewer's letter, Solicitor Baer's statements on behalf of the PTO should be alarming to just about everyone, with the possible exception of accused patent infringers, and most certainly do not reflect well on an agency charged with maintaining the integrity of the patent system. Applicant felt that a meeting with Director Rogan to secure a retraction of those statements would be mutually beneficial to both sides. Yet once again, inexplicably, the PTO was not, and presumably is still not, prepared to discuss this issue.

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[111] The Examiners initially rejected all claims in these cases, but after conducting five lengthy personal interviews with Applicant and carefully considering Applicant's experimental evidence, they ultimately allowed those claims.

These and other unfair assaults on Applicant's patent rights leave him to ponder: What would motivate the PTO to conduct itself with such total disregard for U.S. patent laws and regulations governing its administrative authority just to attack this one Applicant?

Applicant's fear is that these attacks may be attributable to competitors, like Dr. Park, who are coordinating an organized smear campaign to discredit BlackLight's technology. That fear is only heightened by the PTO's hiding behind strained theoretical arguments as an excuse for refusing to fairly evaluate Applicant's experimental evidence, while using its Secret Committee to issue anonymous rejections in this and other BlackLight applications. Dr. Brewer also brought these issues to Director Rogan's attention as an agenda item for a meeting that, unfortunately, has never taken place.

Applicant has a right to know the identity and qualifications of all persons providing input to, or otherwise participating in, the examination process. This information bears directly on the credibility of the rejections that have been entered in this and other BlackLight applications. For instance, if Dr. Park or any of his physicist cronies have been consulted in denying Applicant his patent rights, it would certainly explain the arbitrary and capricious handling of the experimental evidence of record in those cases.

Particularly germane is the identity of <u>all</u> persons responsible for, or otherwise involved in, creating the Office Actions, Attachments, and Appendices that make up the record in this application and other BlackLight cases. To this day, the Committee has refused, without any adequate explanation, to provide this vital information to the detriment of Applicant.

Furthermore, Applicant is entitled to know which PTO officials are ultimately responsible for analyzing Applicant's scientific data evidencing the existence of lower-energy hydrogen, and which officials have the final authority to decide the fate of BlackLight's applications. The Committee's unfair refusal to divulge that information has also seriously handicapped Applicant's ability to effectively respond to and overcome the rejections of record.

For instance, Applicant has been stymied on numerous occasions in attempts to discover the basis for various positions articulated by the Committee, or the status of certain actions it has taken. Seldom are the Examiners of record, who are mere signatories to the Committee's handiwork, or their immediate supervisors, able to give any useful guidance on those subjects, either because they have no authority to do so and cannot divulge who does or, in some cases, they do not know who even has custody of the patent file so as to investigate the answer to a particular question.

Knowing who is responsible for analyzing the record evidence would also allow Applicant to assess that person's qualifications, as compared to those Ph.D. scientists who have peer reviewed the published experimental evidence confirming lower energy states of hydrogen. Equally important, by knowing who has authority to issue BlackLight's applications, Applicant can more easily ascertain and satisfy the patentability standards being applied in rejecting claims to his novel hydrogen technology.

Illustrating this last point, Applicant attempted to force the Secret Committee to set reasonable standards by which his data could be accepted as reliable proof by requesting the personal Interview that was held on February 21, 2001. Of course, to effectively determine the standards being applied against Applicant, he first had to identify the person(s) responsible for setting those standards.

Applicant, however, was only partially successful in that effort. Prior to the February 21 Interview, Applicant's counsel uncovered the identity of only one Committee member, Examiner Vasudevan Jagannathan, who played a role in rejecting BlackLight's applications. Incredibly, Examiner Jagannathan initially denied any such involvement, accurately noting that his name did not appear anywhere in the record. He therefore refused counsel's explicit request that he attend the upcoming Interview. Only after counsel wrote to a high-level supervisor demanding that Examiner Jagannathan attend did counsel receive confirmation that the Examiner was "directly involved in the creation of the Office Action" to be discussed at the Interview and that he would indeed attend. [See January 19, 2001 letter to Director Esther Kepplinger (Attachment K) and February 12, 2001 letter from Director Jacqueline M. Stone (Attachment N).]

Examiner Jagannathan confirmed his direct involvement by leading the Interview discussions. The Examiner's participation afforded Applicant an opportunity to assess his qualifications to examine and evaluate the experimental evidence of record. Applicant was astonished to hear Examiner Jagannathan basically admit he was unqualified to do so based on several of his comments. One of those comments, as discussed previously, included his characterization of Applicant's highly reliable spectroscopic data confirming lower energy states of hydrogen as a "bunch of squiggly lines."

When pressed for guidance on what standards he used to evaluate Applicant's scientific data and to decide whether to issue his patents, Examiner Jagannathan would not elaborate. Rather, he proposed a new standard requiring Applicant to submit and publish his data in peer-reviewed journal articles before he would give it serious consideration. Despite strenuous objections to this newly minted standard requiring public disclosure of confidential information, Applicant has nonetheless worked diligently to comply with it.

Over the subsequent years, Applicant has used vast resources to present experimental evidence of lower energy states of hydrogen—much of it generated by independent third parties—in over 65 peer-reviewed articles published in the prestigious scientific journals mentioned above. Despite this significant accomplishment, the Committee, true to form, has essentially ignored that published evidence.

Even more impressive, Applicant has successfully met the Committee's new "publication" standard despite the attempts of another BlackLight detractor, Dr. Zimmerman, to undermine that effort by contacting various journals to dissuade them from publishing Applicant's articles. [See Attachment H.] Applicant's discovery of Dr. Zimmerman's latest subterfuge is especially alarming given that the Committee has cited non-peer reviewed statements by him—statements that were posted to an internet bulletin board of all places and that he readily admits are biased—to disparage BlackLight's technology. [*See, e.g.,* Applicant's Response to the Committee's 6/11/03 Office Action filed 12/10/03 in U.S. App'n Ser. No. 09/009,294.]

Aside from the fact that the Committee has relied on such non-peer reviewed materials posted to an internet chat group while, at the same time, requiring that

Applicant's submitted materials be subjected to peer review—a double standard if there ever was one[112]—the Committee shows extreme bias and rather poor judgment in citing material from an arch cynic with a significant vested interest that he is openly protecting. As previously noted, Dr. Zimmerman's proclamations of his efforts to sabotoge Applicant's patent rights are well known. The Committee needs no reminding that Dr. Zimmerman is the former Chief Scientist for the U.S. State Department who published an Abstract of a proposed APS speech boasting how his Department and the Patent Office "have fought back with success" against BlackLight. [See Attachment K, Tab C.] And again, it was Dr. Zimmerman who informed Applicant that his colleague, APS Spokesman, Dr. Park, has communicated with a PTO contact he refers to as "Deep Throat" with access to confidential patent information. [*See supra.*]

If, as Applicant suspects, the Committee has cooperated with Dr. Zimmerman, or other biased individuals, in denying Applicant his patent rights, while those same individuals have worked behind the scenes to undermine Applicant's compliance with the Committee's concocted publication requirement, then again, that information is highly relevant and should be disclosed without further delay. Such a scenario would be entirely consistent with the Dr. Zimmerman's prior admission proudly proclaiming his success in sabotaging Applicant's patent rights.[113]

Applicant is deeply concerned that the Committee has continued its questionable practice of cooperating with Applicant's competitors, including Dr. Zimmerman and Dr. Park, in thwarting Applicant's patent rights. This concern is only bolstered by its citation

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[112] Not surprisingly, the Committee cannot explain why it required that all materials in support of Applicant's discovery of lower-energy hydrogen be submitted for peer review and publication in qualified scientific journals when biased statements taken from Applicant's competitors are not subjected to the same scrutiny. The Committee's imposition of this obvious double standard merely further highlights the arbitrary and capricious manner in which the Committee has handled this and other BlackLight applications.

[113] Having relied on Dr. Zimmerman's opinion to disparage Applicant's technology, the Committee is constrained to also address the issues raised herein regarding the efforts of Dr. Zimmerman and his APS colleagues—Dr. Park in particular—to sabotage Applicant's patent rights. The Committee's further requirement that Applicant's technology achieve "support in the scientific community" is also affected by Dr. Zimmerman's clandestine activities and, thus, warrants further investigation. In view of this onerous patentablity requirement foisted upon Applicant, anyone who has influence with the Committee should not be using the internet to disparage Applicant's technology and, most certainly, should not be relied upon for his opinions.

to Dr. Zimmerman's non-peer-reviewed, unsubstantiated comments appearing in his paper.[114] [*See, e.g.,* Applicant's Response to the Committee's 6/11/03 Office Action filed 12/10/03 in U.S. App'n Ser. No. 09/009,294.] Prominently displayed on the front page of that paper is the following copyright notice:

> This entire article is copyright 2001 by Peter D. Zimmerman. No forwarding, reposting, copying, excerpting or direct quotation **whatsoever**, even for the purpose of reviews, or storage in any data base or storage system other than the HSG files on Yahoo.com or on the author's personal computer is permitted without the express written permission of the author.
>
> © Peter D. Zimmerman, 2001. All rights reserved. [Emphasis in original.]

Applicant must assume that the PTO, an agency obviously well versed in intellectual property rights, would not have willfully violated the terms of Dr. Zimmerman's copyright notice. Thus, it must be presumed that the agency has been in contact with Dr. Zimmerman, at the very least to secure his permission to reproduce this paper, if not to secure his cooperation in others ways that continue to undermine Applicant's patent rights. Applicant is entitled to know the extent of those contacts and the nature of any communications between the PTO and either Dr. Zimmerman or his colleague Dr. Park.

Applicant is hardly surprised by his inability to break the PTO's code of silence on the suspicious handling of BlackLight's applications given that the PTO is also stonewalling similar inquiries from five U.S. Senators—four of whom requested that Senator Patrick Leahy, Chairman of the Judiciary Committee overseeing the PTO, and/or Commerce Secretary Donald Evans, look into this matter. [See letters to and from Senators Max Cleland, Robert Torricelli, Jon Corzine, Ron Wyden, and Gordon

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[114] Dr. Zimmerman's paper, entitled, "An Analysis of Theoretical Flaws in So-Called Classical Quantum Mechanics and of Experimental Evidence against CQM" has no merit whatsoever. Applicant notes that the Committee has ignored Dr. Mills' extensive rebuttal arguments to Dr. Zimmerman's paper posted in the same internet chat room that Dr. Zimmerman posted his paper. Applicant has provided the Committee with Dr. Mills' rebuttal on numerous occasions, but has yet to receive its response to his arguments, which should given the same level of reliability accorded Dr. Zimmerman's unpublished comments. [See Attachment I.]

Smith (Attachment O).] The PTO's continued refusal to cooperate in response to Senate inquiries suggests that, perhaps, it has something to hide.[115]

If the PTO looks to the Federal Circuit's June 28, 2002 Decision for license to continue its unfair and dilatory prosecution through secret examination, it will not find it. Indeed, Judge Newman, in rationalizing her ruling, incorrectly assumed that the PTO would fairly and expeditiously prosecute BlackLight's applications:

> Such action must of course be reasonable under the circumstances and rare in occurrence, lest the emergency become the rule. But when necessary in order to fulfill the PTO's mission, with safeguards to the interests of the applicant including fair and expeditious further examination, we agree with the district court that the action taken is a permissible implementation of the statute and regulation. [See *BlackLight Power* at pages 1537-38 (Attachment B) (Emphasis added).]

Nothing could be further from the truth. As documented by Applicant, the PTO's prosecution of BlackLight's applications has been nothing short of hostile and its attempt to hide the mistreatment of Applicant behind the authority of a Secret Committee only exacerbates the unfairness of those actions and the lack of adequate safeguards. Worse yet, the Committee's lead examiner, Dr. Souw, now takes an extreme position that misconstrues the Federal Circuit's June 28, 2002 Decision, and the underlying D.C. District Court Decision, on a purely procedural issue, *i.e.,* whether the PTO could properly withdraw an allowed application after payment of the issue fee, and transforms those cases into rulings on the merits of Applicant's invention that supposedly support Dr. Souw's § 101 and § 112, ¶1 rejections. [See, e.g., 11/14/05 Office Action filed in U.S. App'n Ser. No. 09/813,792 at 14, 17.] No doubt the Federal Circuit and District Court Judges who delivered the procedural rulings in those cases would be surprised to learn that Dr. Souw, who competes with Applicant as President of

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[115] In the PTO's reply to the Senators' inquiry letters, Robert L. Stoll, Administrator for External Affairs, contended that any comments in response to those inquiries would be "inappropriate" because of the then-pending appeal to the Federal Circuit in *BlackLight Power Inc. v. Dickinson*, Civ. No. 00-0422 (D.D.C). [See Attachment O.] Putting aside the fact that the issues then on appeal had absolutely nothing to do with the points of inquiry, this contrived excuse has gone stale as the Federal Circuit decided that case many years ago in June 2002. [See Attachment B.] By its own statements, nothing now prevents the PTO from cooperating with the U.S. Senate regarding the administrative irregularities brought to its attention.

BMS Enterprise while examining his pending patent applications, would proffer such a blatant mischaracterization.

Because this untenable situation has failed to provide the safeguards to the interests of Applicant, including the fair and expeditious further examination contemplated by the Federal Circuit in its Decision, Applicant has herein requested an equitable remedy that the PTO immediately issue all five of the withdrawn BlackLight applications that gave rise to that Decision. [See Demand for Information and Redress, *infra*.]

Applicant strongly urges the PTO to break its silence and to engage in an open and honest discussion of these issues that continue to plague the examination of BlackLight's pending applications. To this end, Applicant renews his earlier offer, as expressed in Dr. Brewer's December 21, 2001 letter, to meet with the PTO Director and/or any other government officials, anywhere, anytime, to resolve these outstanding issues. Applicant sincerely hopes that the Director will likewise commit himself to achieving the same objective so that a fair and expeditious prosecution of all of BlackLight's applications that safeguards Applicant's interests, as envisioned by the Federal Circuit, can be achieved with mutually beneficial results.

Part of that forward movement should include a complete and proper consideration of Applicant's overwhelming experimental evidence confirming the utility and enablement of Applicant's novel hydrogen technology. In view of that evidence, Applicant submits that the rejections under 35 U.S.C. §§ 101 and 112 are misplaced and should be withdrawn, and that the present application is in condition for allowance.

Discussions Held And Agreements Reached
During The February 11, 2003 Interview

The above-mentioned problems associated with the Secret Committee's examination of this and other BlackLight applications can be summarized as follows based on its failure to:

(1) identify all persons from within and outside the Patent Office who contributed to, or were otherwise involved in, withdrawing or rejecting BlackLight's applications;

(2) identify those persons having ultimate authority to analyze the vast body of experimental evidence demonstrating the existence of lower energy states of hydrogen and, based on that analysis, for deciding whether to issue patents on Applicant's novel hydrogen technology;

(3) establish and apply consistent patentability standards and guidelines by which that patentability decision is to be made; and

(4) properly analyze the evidence of record—now published, or to be published, in over 65 peer-reviewed journal articles—that the Committee required Applicant to submit.

The Committee merely perpetuated those failures in its previous Office Actions by dismissing, without serious analysis, Applicant's submitted data evidencing lower energy states of hydrogen. Frustrated by the Committee's inaction, but still determined to get a fair and expeditious hearing, Applicant requested and received the courtesy of another personal Interview, held February 11, 2003, to present his evidence and to discern the standards by which the ultimate decision-maker would be evaluating it.[116]

To that end, Applicant repeatedly requested that Examiner Jagannathan attend the Interview, since he had led the prior Interview held February 21, 2001, and, despite attempts to keep his identity secret, he was the only person known at the time to have been directly involved in creating the substantive Office Actions of record. Specifically, Applicant sought to question Examiner Jagannathan on why he still refused to accept Applicant's scientific data evidencing lower-energy hydrogen after it had been published, or was soon to be published, in what was then over 40 (now over 65) peer-reviewed journal articles, which he himself had required. Applicant, however, never got the chance to pose that question. Without explanation, Examiner Jagannathan refused to attend the Interview, just as he had refused to attend the Interview held two years earlier—only this time, he did not show up.

Applicant also requested that Examiners Wayne Langel and Stephen Kalafut attend the Interview, since they had previously allowed the five BlackLight applications

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[116] Although the Interview Summary does not specifically list the serial number of all BlackLight applications as being the subject of the February 11, 2003 Interview, Examiners Langel and Kalafut agreed beforehand that the Interview would be held to address the similar rejection of claims in all assigned BlackLight cases based on an alleged lack of utility and inoperability.

that were mysteriously withdrawn from issue and their names were the only ones appearing in the record as signers of the substantive Office Actions under consideration. Examiners Langel and Kalafut did appear for the Interview, together with their immediate supervisors, SPE's Patrick Ryan and Stanley Silverman. Examiner William Wayner, who was assigned to one BlackLight application prior to his retirement from the PTO and who expressed an interest in attending the Interview, also appeared.

Also attending the Interview and leading the discussions on the PTO's behalf was Quality Assurance Specialist Douglas McGinty, who until that time had never been identified to Applicant as having played any role in the examination of his applications.

Attending the Interview on behalf of BlackLight Power were the inventor, Dr. Randell L. Mills, his counsel, Jeffrey S. Melcher and Jeffrey A. Simenauer, and company Director Dr. Shelby Brewer.

Also attending the Interview as an observer at Applicant's request was Ted C. Liu, Senior Legislative Assistant for Congressman David Wu, who represents the 1st District of Oregon.

During the Interview, Applicant made a sincere effort to advance the prosecution of his applications and to find common ground upon which all of these cases, once again, would be allowed to issue as patents. Applicant believed it was a worthwhile effort in light of Examiner Langel's statements on the record reaffirming his consistent view that Applicant's novel hydrogen technology is fully operable and, therefore, entitled to patent protection. The Interview was also significant in view of the following representations and agreements that resulted from the discussions between Applicant and lead-Specialist McGinty:

(1) Applicant will identify the scientific data supporting lower energy states of hydrogen generated and furnished by independent third parties;

(2) the Examiners whose signatures appear on the rejections of record, *i.e.*, Examiners Langel, Kalafut, and Wayner, have full authority to review that data and, based on their review, to issue patents as deemed appropriate; and

(3) Applicant will confer with the signatory Examiners, either by telephone or in person, to review each assigned application on a claim-by-claim basis to ensure that the scientific data presented adequately supports the scope of the

claims. For those claims determined to be adequately supported by the data, a patent will issue. For any claims deemed to be inadequately supported, Applicant reserves the right to continue seeking that broader claim coverage in subsequent proceedings.

Applicant appreciated the guidance Specialist McGinty provided during the Interview for securing BlackLight's patents. Based on that guidance, Applicant presented comments in two pending applications for which Responses were due detailing the substance of discussions held at the Patent Office on February 11th and identifying the independent, third-party data per agreement (1) above, which information is reproduced below. [U.S. App'n Ser. Nos. 09/110,678 and 09/362,693.]

Applicant's comments confirmed Examiner Langel's long-held view that the claims in those cases were in condition for allowance. Applicant therefore requested that Examiner Langel exercise his authority to issue a Notice to that effect per agreement (2) above so that patents could then be issued.

Following up on the Responses filed in those pending applications per agreement (3) above, Applicant arranged for an Interview with Examiner Langel to review the cases on a claim-by-claim basis to ensure that the scientific data presented adequately supported the scope of the claims in those cases. In fact, Applicant and Examiner Langel reached a tentative understanding that certain claims were adequately supported by the data and that Applicant was therefore entitled to his patents.

Unfortunately for Applicant, that understanding was short lived after Examiner Langel, "for moral and ethical reasons," agreed under the most grievous of circumstances to his removal from examining all BlackLight applications to which he was assigned. Applicant was dismayed to further learn from Examiner Langel that the PTO has adopted an "allowance is not an option" policy with respect to all pending BlackLight applications. Before discussing the prejudicial ramifications of these unfortunate incidents, however, Applicant presents the following recap of the

discussions held during the February 11, 2003 Interview that lead to the above agreements.[117]

Just prior to the Interview, Specialist McGinty asked that Mr. Liu speak by telephone with Talis Dzenitis, a Congressional Affairs Specialist in the PTO's Legislative and International Affairs Office, to discuss his reasons for attending. Mr. Liu explained to Specialist Dzenitis that a constituent associated with BlackLight had contacted Congressman David Wu complaining of the irregular procedures the PTO has used in examining the company's pending patent applications. The procedures complained of included the PTO's withdrawal of the five applications approved by Examiners Langel and Kalafut for issuance as patents and the subsequent rejection of those and other BlackLight applications by an unknown group of PTO officials referred to by Applicant as a "Secret Committee."

Specialist Dzenitis represented to Mr. Liu that no such secret committee existed at the Patent Office. Applicant was surprised by that representation considering that a group of anonymous PTO officials were known to be handling BlackLight's applications and drafting the substantive Office Actions that the Examiners of record were instructed to sign.

Examiner Langel confirmed as much in an extended discussion he had with Mr. Liu and Applicant's counsel following the formal phase of the Interview. During that discussion, Examiner Langel repeated his prior denials of having authored the substantive Office Actions of record in the BlackLight applications to which he was assigned, even though those Actions bear his signature. Examiner Langel also repeated his previously expressed views that Applicant is entitled to patents on his novel hydrogen technology and that he wanted to issue those patents. Examiner Langel explained, however, that other PTO officials unknown to him having higher authority were responsible for drafting the substantive Office Actions he signed and for deciding whether to issue Applicant his patents.

The only person Examiner Langel could identify for Mr. Liu as "having something to do with the Office Actions" was Examiner Jagannathan, whose name does not

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[117] Much of the substance of these discussions was confirmed in e-mail correspondence between Mr. Liu and Applicant's Counsel. [See Attachment P.]

appear on any Office Action. As noted above, Examiner Jagannathan kept his identity a secret from Applicant until counsel exposed his direct involvement in creating the Office Actions of record and forced him to attend the prior Interview that he led on February 21, 2001. [See January 19, 2001 letter to Director Esther Kepplinger (Attachment K) and February 12, 2001 letter from Director Jacqueline M. Stone (Attachment N).] When the recent February 11, 2003 Interview started, it was Specialist McGinty, another previously unidentified PTO official, who led the discussion.

Following the telephone conversation with Specialist Dzenitis, in which he denied the existence of a secret committee, Mr. Liu joined the Interview already in progress. Applicant began the Interview with a general discussion of his novel hydrogen technology and a presentation of the experimental evidence confirming its operation and utility. Specifically, Applicant explained to the PTO officials in attendance how independent laboratory studies, including those conducted by a leading Los Alamos researcher and by a NASA funded group, as well as other highly reliable scientific data, demonstrate the existence of lower energy states of hydrogen underlying his technology.

At no time during Applicant's presentation did the PTO officials analyze or otherwise address to any significant degree the merits of that data proving the existence of lower-energy hydrogen. Rather, these officials—with the exception of Examiner Langel—raised non-technical arguments, similar to those raised in the pending Office Actions, why lower-energy hydrogen could not exist and, thus, why they were justified in according the real-world data little or no weight.

The first such argument, raised by Examiner Wayner, was based on unrelated technologies that have been subjected to ridicule in the scientific community, such as perpetual motion, cold fusion, and 100-miles-per-gallon carburetors. Examiner Wayner compared those controversial technologies to BlackLight's novel hydrogen chemistry and then asked Applicant: "How is your invention any different?"

Applicant pointed out significant differences. Unlike the far-fetched inventions mentioned by Examiner Wayner, Applicant explained that his inventions have been actually reduced to practice, as demonstrated by the many working prototype energy cells developed over the past ten years and the novel chemical compounds produced

by the process, which were made available to the PTO in the past and again during the Interview. In fact, Applicant invited the PTO officials to visit his laboratory in Cranbury, New Jersey at his expense and to witness the operation of his energy cells for themselves, but like prior invitations, this one too was ignored.[118]

Applicant further distinguished his claimed inventions based on the substantial body of experimental evidence that corroborates the existence of lower energy states of hydrogen. Again, none of the PTO officials who raised non-technical arguments questioning the operability of Applicant's novel hydrogen technology made any real attempt to analyze that corroborating evidence. Indeed, Examiner Wayner frankly admitted that his background was in mechanical engineering and, therefore, he was not qualified to conduct such an analysis.

Examiner Wayner also questioned why, if BlackLight's technology was such an important discovery, the company had not yet developed a commercial device for producing energy. Applicant explained that the high cost of developing commercial products was an impediment and that, because BlackLight was not well-suited to undertake such development, it was looking to license patents on its technology to other companies to commercially exploit that technology.

Concerned that Examiner Wayner might be introducing yet another new patentability standard, requiring the sale of a commercial product, counsel pressed the Examiner on whether that was his intention. Examiner Wayner plainly stated it was not and, in response to a specific question from Mr. Liu, affirmed that Applicant need not prove commercial applicability to secure a patent for his invention.[119]

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[118] Dr. Shelby Brewer, a BlackLight Director and former Assistant Secretary of Energy in the Reagan Administration, first invited PTO officials to visit BlackLight's laboratory in Cranbury, New Jersey to "witness first hand our working prototypes of Dr. Mills' energy cell and his assortment of novel hydride compounds exhibiting unusual properties" in his December 21, 2001 letter addressed to then-Director James E. Rogan. [Attachment A] Although the PTO has been frequently reminded of this open invitation, it has stubbornly refused to accept or even acknowledge it.

[119] Despite these assurances, Applicant is proceeding under the assumption that the PTO is requiring proof of commercial viability before it will issue him any patents on his novel hydrogen technology, especially in light of his discovery that the Committee now takes the position that "allowance is not an option" in BlackLight's cases. [See *infra.*] Issuance of Applicant's patents, however, should not be delayed while awaiting his own commercial development of that technology, especially now that Applicant has learned that at least one foreign company is nearing introduction of a product based on Applicant's lower-energy hydrogen technology into the U.S. market. Applicant is entitled to his patents to exclude

Applicant also became alarmed when Examiner Wayner, in referring generally to BlackLight's "detractors," invoked only the name of APS lobbyist and spokesman Dr. Robert Park as someone who disputes the existence of lower energy states of hydrogen.[120] Applicant's counsel wanted to raise issues relating to Dr. Park's "Deep Throat" contact in the Patent Office and his reputation for conducting "hatchet jobs" on new technologies that threaten his lobbying of hundreds of millions of dollars on behalf of the APS to federally fund its pet projects. [See *supra*.] Specialist McGinty, however, cut counsel off, refusing to discuss the matter. When Specialist McGinty suggested that BlackLight has a "similar agenda," noting its recent NASA contract, Applicant corrected him, explaining that BlackLight does not receive any government funding for its research. Specialist McGinty had no response and the discussion moved onto other, less controversial subjects.

Examiner Wayner raised other issues regarding the reliability of the scientific evidence presented by Applicant. That evidence included spectroscopic data, which counsel described as being equivalent to a "chemical fingerprint." Counsel further noted that Dr. Park himself, whom Examiner Wayner identified as BlackLight's chief antagonist, has proclaimed the extraordinary reliability of spectroscopic data. [See *supra*.]

Yet when Applicant tried to present this highly reliable spectroscopic data at the Interview showing the spectral lines corresponding to lower-energy hydrogen, *i.e.*, a "hydrino" state, Examiner Wayner interrupted, commenting that "spectroscopic lines are meaningless" and "don't mean a hill of beans" to him. That comment was reminiscent

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that company and others from commercially exploiting that technology absent the payment of royalties that would be due under those patents.

[120] To Applicant's astonishment, in the Office Actions issued in Examiner Wayner's one assigned case, the Committee has continued to cite Dr. Park's biased statements against Applicant as a basis for rejecting claims in this case:

> The opinion of Robert Park set forth in the Examiner's action of 4/14/00, paper #16. i.e. "But according to the country's leading organization of academic physicists, Mills' hydrino theory has no credibility. "There is virtually nothing that science does not know about the hydrogen atom," said Robert Park, director of the Washingtong [sic] office of the American Physical Society. "The ground state is defined as the (energy) state below which you cannot go ... the thought there is some state below the ground state is kind of humerous [sic]." [See 4/26/04 Office Action at p. 4 in U.S. App'n Ser. No. 09/181,180.]

of a previous one by Examiner Jagannathan characterizing Applicant's spectroscopic data as "a bunch of squiggly lines." [See *supra*.]

Counsel again became concerned that BlackLight's applications were being evaluated using rather loose patentability standards. Counsel therefore requested that the PTO officials provide some guidance regarding the evidentiary requirements they were imposing on Applicant. Specialist McGinty and Examiner Wayner at first did not respond directly to Counsel's request for guidance, but rather began questioning the accuracy of the test data Applicant submitted to confirm the existence of lower energy hydrogen.

Applicant explained that the submitted test data was generated by highly qualified Ph.D. scientists, many of whom represent independent laboratories. Applicant further noted how this data had been extensively peer-reviewed in the 40-plus (now over 65) articles published, or soon to be published, in prestigious scientific journals, including the *Journal of Applied Physics*. Applicant also provided Specialist McGinty—much to his surprise—with specific data showing the lower-energy state spectral lines that were published in the prestigious spectroscopic publication, *Journal of Molecular Structure*.

Applicant was astounded by the refusal of Specialist McGinty and Examiner Wayner to accept the reliability of the scientific data appearing in these published journal articles, especially considering the PTO's routine acceptance of evidence submitted in printed publications to overcome utility rejections. See, *e.g.*, MPEP § 2107.01 (VI) pp. 2100-33 ("An applicant can [submit evidence in response to a utility rejection] using any combination of the following: amendments to the claims, arguments or reasoning, or new evidence submitted in an affidavit or declaration under 37 CFR 1.132, or in **a printed publication**." (emphasis added)).

Counsel also reminded the PTO officials of the standard imposed by lead-Examiner Jagannathan during the previous Interview held February 21, 2001 that conditioned his consideration of evidence of lower-energy hydrogen on its publication in peer-reviewed journal articles based on the reliability of the peer-review process. Counsel then noted once again that, despite Examiner Jagannathan's failure to provide legal authority for imposing this unreasonable standard, Applicant had not only met it,

but had exceeded it with over 40 (now over 65) journal articles. Having done so, counsel expressed extreme frustration with the PTO's continued refusal to seriously analyze the published scientific data based on manufactured excuses, such as this newly concocted one concerning the accuracy of Applicant's data.

Specialist McGinty raised yet another weak excuse for ignoring the published data by asking what assurances Applicant could provide that the journal articles had been actually peer reviewed! Mystified by that question, Applicant could only state what is a simple known fact: to get scientific data published in a journal article, it must first go through a rigorous peer-review process. Indeed, many of Applicant's articles went through numerous drafts and required further experimentation as directed by the Ph.D. scientists who peer reviewed those articles.

At that point in the Interview, Specialist McGinty admitted that, like Examiner Wayner, he was not qualified to analyze the published data. Applicant was surprised by that admission, since the Interview was being led by Specialist McGinty and had been arranged for the express purpose of presenting the experimental evidence of record.

Examiner McGinty's admission merely fueled Applicant's prior concerns that his published scientific data was not being properly considered, prompting counsel to ask who was responsible for analyzing that data. Specialist McGinty replied by stating that Examiners Langel and Kalafut, the Examiners of record, had that responsibility. That too came as a surprise since Examiners Langel and Kalafut were the ones who had originally reviewed Applicant's experimental evidence in allowing the five BlackLight applications that were subsequently withdrawn from issue. Applicant, however, was relieved to learn that these two Examiners, who had over 50 years of experience between them and who were obviously qualified to analyze the published data, were being reassigned that task.

Counsel then addressed the vexing problem of constantly changing patentability standards that had been plaguing the examination process. Counsel specifically mentioned, for example, the prior Office Actions that claimed Applicant's lower-energy hydrogen technology violated known laws of physics and chemistry without specifically identifying even one such law, and then required Applicant to prove otherwise.

Counsel also cited a recent Office Action dismissing Applicant's scientific data out of hand for failing to prove the invalidity of quantum theory:

> The request for reconsideration has been entered and considered but does not overcome the rejection . . . because there is no evidence presented which would prove applicant's contention that the theory of quantum mechanics is invalid." [October 7, 2002 Advisory Action entered in U.S. Serial No. 09/110,717.]

When Specialist McGinty accused Applicant of putting a "spin" on the Examiner's rejection, counsel noted that he had been reading the above quotation directly from the Office Action.

Counsel also mentioned other recent Office Actions filed in BlackLight cases that dismissed Applicant's recent submission of peer-reviewed journal articles, in accordance with the standards imposed by Examiner Jagannathan, as being merely "cumulative" when it clearly was not and even the originally submitted evidence had not been properly analyzed.

Expressing frustration over the PTO's failure to provide any consistent patentability standards to guide Applicant, counsel once again requested that Specialist McGinty provide such guidance. Specialist McGinty again raised concern over the integrity of the experimental evidence, but indicated that he would be more receptive to that evidence if it was validated by independent third parties.[121]

Applicant explained to Specialist McGinty that much of the evidence submitted over the previous four years was, in fact, generated by independent third parties. Applicant then began citing examples of the extensive independent third-party evidence disclosed in publications previously cited to the PTO, as well as more recently generated evidence that was subsequently submitted.[122] Specialist McGinty did not

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[121] Just as Specialist McGinty sought assurances at the February 11 Interview that persons involved in generating and furnishing the scientific data submitted by Applicant are independent and unbiased, Applicant deserves similar assurances that those involved in rejecting BlackLight's applications are also independent and unbiased. Despite Applicant's repeated requests for such assurances, none have been given. The genuine conflicts of interest uncovered by Applicant involving Examiner Souw and his clearly biased views against BlackLight adopted by the Committee merely underscore the importance of this highly relevant information.

[122] See R. L. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy", Int. J. Hydrogen Energy, Vol. 26, No. 9, (2001), pp. 965-979.

respond, whereupon counsel noted that the PTO's unfounded concern that the record evidence lacked third-party validation merely demonstrated its failure to thoroughly analyze that evidence.

Further demonstrating a lack of familiarity with the record evidence, Specialist McGinty criticized Applicant's experimental evidence as a whole by referring numerous times to only high-power plasma data. Applicant repeatedly pointed out that the plasma data was but a small fraction of the submitted evidence and that it was presented primarily to provide additional support for his plasma-related applications.

Applicant noted that the vast body of other scientific data he submitted relates to a broad range of analytical studies demonstrating the existence of lower energy states of hydrogen. For example, regarding those applications relating to novel chemical compounds, Applicant pointed Specialist McGinty to the extensive spectroscopic data supporting the identification of those compounds. Specialist McGinty, however, apparently did not understand the significance of that data, stating that the NMR data confirming lower-energy hydrogen could have been due to nitrogen. Applicant had to explain that, as a matter of basic scientific knowledge, NMR data only shows protons and that no other element but hydrogen is in the data range. Applicant also explained that the NMR data confirms the presence of an internal energy source.

Knowing that highly qualified Examiners Langel and Kalafut were once again responsible for analyzing the published data was reassuring. There still remained, however, one nagging issue, namely, who had the ultimate authority to issue Applicant his patents. Counsel expressed concern that the pending applications were being examined in secret and that, without knowing who had that authority, Applicant was being unfairly denied an opportunity to present his case to the actual decision-maker.

R. L. Mills, P. Ray, B. Dhandapani, M. Nansteel, X. Chen, J. He, "New Power Source from Fractional Quantum Energy Levels of Atomic Hydrogen that Surpasses Internal Combustion", J. Mol. Struct., Vol. 643, No. 1-3, (2002), pp. 43-54.

J. Phillips, R. L. Mills, X. Chen, "Water Bath Calorimetric Study of Excess Heat in 'Resonance Transfer' Plasmas", Journal of Applied Physics, submitted.

A. J. Marchese, P. M. Jansson, J. L. Schmalzel, "The BlackLight Rocket Engine", Phase I Final Report, NASA Institute for Advanced Concepts Phase I, May 1-November 30, 2002, http://www.niac.usra.edu/files/studies/final_report/pdf/752Marchese.pdf.

Specialist McGinty then stated in no uncertain terms that Examiners Langel, Kalafut, and Wayner, the signers of the Office Actions under consideration, had "full authority" to examine the pending applications and to issue the patents.

Upon hearing that statement, counsel immediately turned to Examiner Langel and asked him point blank whether, after having studied the experimental evidence of record, he still believed that BlackLight's patent applications were allowable. The Examiner replied in no uncertain terms, "Yes, they're still allowable."

Counsel then asked Examiner Langel whether he was prepared to immediately allow the claims and issue Applicant his patents in those applications assigned to him, as is customary during an Interview, to which the Examiner replied, "Fine with me."

Specialist McGinty, however, expressed uneasiness over Examiner Langel's agreement to allow claims at the Interview. Specifically, he stated his concern that even if Applicant's claimed technology were found to be operable, there were still issues of novelty and nonobviousness to be addressed before a patent could be issued.

Counsel was surprised by that statement given the PTO's arguments over the prior three years that Applicant's inventions were inoperable based on an incorrect assumption that lower-energy hydrogen cannot possibly exist. Counsel pointed out the obvious contradiction in arguing that the Examiners may still need to conduct a prior art search for possible disclosure of Applicant's lower-energy hydrogen technology.

Counsel further noted the PTO's own examination guidelines requiring Examiners to evaluate the operability and utility of a claimed invention together with its novelty and nonobviousness following a complete prior art search. See MPEP § 706.[123] Counsel again turned to Examiner Langel to confirm whether that was his understanding. The Examiner replied that it was and indicated that, in fact, the first

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[123] MPEP § 706 provides in pertinent part:

> After the application has been read and the claimed invention understood, a prior art search for the claimed invention is made. With the results of the prior art search, including any references provided by the applicant, the patent application should be reviewed and analyzed in conjunction with the state of the prior art to determine whether the claims define a useful, novel, nonobvious, and enabled invention that has been clearly described in the specification. The goal of examination is to clearly articulate any rejection early in the prosecution process so that the applicant has the opportunity to provide evidence of patentability and otherwise reply completely at the earliest opportunity.

thing he did was to conduct a thorough prior art search because he thought that might be the easiest way to dispose of the applications assigned to him. Examiner Langel explained, however, that he was unable to reject the applications on prior art grounds, which was why he originally allowed them.

Counsel acknowledged Specialist McGinty's hesitance to issue Applicant patents covering his claims at the Interview and assured him that Applicant wanted to work with him to remove any lingering concerns. Counsel then specifically asked Specialist McGinty to articulate how they might proceed in trying to accomplish that mutually beneficial goal. In response, Specialist McGinty indicated that, in the next Response to any pending or subsequent Office Actions, Applicant should focus on identifying the scientific data generated by independent third-party testing, as opposed to test data generated solely by Applicant. Counsel agreed to do that.

Specialist McGinty further expressed concern over whether that scientific data, even if assumed to be reliable, was commensurate with the scope of the claims of the various applications to adequately support patentability. Counsel stated that Applicant's data did adequately support the claimed subject matter. Counsel, however, recommended reviewing the claims of each application one by one with the assigned Examiners to see if at least some agreement could be reached as to those claims that are adequately supported and for which patents can be issued. As for any remaining claims that the Examiners believe are not adequately supported by the scientific data, Applicant would be free to seek such broader claim coverage through continued prosecution.

Specialist McGinty agreed that this was a reasonable way to proceed and granted a request by counsel, Mr. Simenauer, that this agreement be memorialized in writing in an attachment to the Interview Summary Form. Mr. Simenauer offered to draft this agreement, as is common practice, and Specialist McGinty enthusiastically accepted the offer. Mr. Simenauer then drafted the following Attachment as Specialist McGinty looked on:

ATTACHMENT TO INTERVIEW SUMMARY FORM

> Applicant requested that the following points discussed at the Interview held on February 11, 2003 be included as an Attachment to the Interview Summary Form.
>
> Applicant's counsel and the Examiners in attendance at the Interview agreed to meet again at a future date, either in person or by telephone, to continue discussions regarding the patentability of Applicant's pending patent applications. Specifically, the Examiners expressed concern that Applicant's experimental evidence be commensurate with the scope of the claims. To address that concern, Applicant's counsel agreed with the Examiners to go through the patent applications claim-by-claim with the Examiners and demonstrate how the scientific data supports those claims.
>
> For those claims that are supported by the data, the PTO agrees to issue those claims. For those claims that the PTO determines are not supported by the data, Applicant will continue to seek that broader claim coverage in subsequent proceedings. [Attachment F]

After completing the two-page handwritten Attachment, Mr. Simenauer read it out loud in the presence of Specialist McGinty and Examiner Langel so that they could confirm its accuracy and make any necessary changes. When asked by counsel whether they were satisfied with the wording of the Attachment, Specialist McGinty stated that he was, as did Examiner Langel, who then signed each of the two pages. There was absolutely no confusion as to the agreement to issue patents for those claims found to be supported by the scientific data.

Incredibly, in a transparent attempt to rewrite history, some unknown PTO official apparently instructed Examiner Langel to sign a subsequent communication mailed over two weeks later, on February 26, 2003, that included an attached "Supplement to Interview Summary" (Attachment F), which provides in pertinent part:

> The following is a supplement to the summary concerning the February 11, 2003 interview re 09/501,622, etc. . . . A two-page Interview Summary was provided by Examiner Langel. A two page "Attachment to Interview Summary Form" also was provided by Mr. Simenauer. While the Attachment may represent the applicant's understanding of the interview, two points must be clarified.
>
> First the second page of the applicant's attachment states in part: "for those claims that are supported by the data, the PTO agrees to issue those claims." The PTO made no such agreement. Instead, the PTO representatives indicated

that the rejections under both 35 USC 101 and 112, 1st para., are outstanding and that evidence as to verification by credible, established, independent third parties would carry more persuasive weight.

Second, QAS Douglas McGinty was not listed in the Examiner's Interview Summary. He was present during the interview with the aforementioned attendees.

[signed] Wayne Langel
Primary Examiner
Art unit 1754

If PTO officials wanted to retract one of the key agreements reached at the Interview, they should have expressly said so, identifying who made the decision and giving reasons for the retraction. Since this was not done, Applicant has no choice but to rely on the accuracy of the contemporaneous written record.

Moreover, in view of other agreements reached at the Interview, the suggestion that there was no agreement to issue patents under the stated conditions is absurd—though hardly surprising given the sordid prosecution history of BlackLight's patent applications. Specialist McGinty plainly stated on the record that the Examiners who signed the outstanding rejections have full authority to review the data and to issue Applicant his patents. Also of record is Examiner Langel's unequivocal statement that, based on his review, he was prepared to issue those patents. To then force this same Examiner to sign a statement two weeks after the fact denying that "for those claims that are supported by the data, the PTO agrees to issue those claims" is, frankly, embarrassing.

Other ineffective arguments, such as those made by Examiner Kalafut that "the present Examiner did not commit to any agreements during the interview," are also disappointing and, hopefully, will not be repeated. [See Advisory Action dated April 2, 2003 filed in U.S. App'n Ser. No. 08/467,911.] Applicant acknowledges that, to the best of his recollection, Examiner Kalafut, although present at the February 11 Interview, did not speak a word. As previously indicated, it was Specialist McGinty who led the Interview on behalf of the PTO and it was he who ultimately agreed to the terms under which examination of BlackLight's patent applications would proceed, which terms were expressly reduced to writing. For Examiner Kalafut, or any other Examiner assigned to

one of BlackLight's applications, to now attempt to distance themselves from that agreement based on the weak assertion that they did not personally commit to it during the Interview merely illustrates yet another example of the PTO's arbitrary and capricious approach to examining these applications.

Applicant's Identification of Scientific Data Supporting Lower energy States of Hydrogen Generated and Furnished By Independent Third-Parties

In light of the controversial prosecution history of this and other pending BlackLight cases, Applicant appreciated what seemed to be Specialist McGinty's willingness to set reasonable standards and guidelines by which Applicant's patents could finally be issued. Applicant acknowledged and documented Specialist McGinty's concern over the reliability of the record evidence, which led to his requirement that Applicant identify independent third-party verification of the scientific data as noted in the PTO's Supplement to Interview Summary. With those standards and guidelines in mind, Applicant presented in two pending applications a summary of the scientific data supporting lower energy states of hydrogen generated and furnished by independent third parties, which data is reproduced below along with additional, newly submitted data.[124]

Experimental Evidence Generated by Independent Third Parties

Applicant is unaware of any statutes, rules, or case law requiring that experimental evidence submitted by an Applicant in response to a rejection by the PTO be generated by independent third parties. Despite the higher standard imposed by Specialist McGinty requiring such third-party validation of the evidence, Applicant still has met and far exceeded this standard as shown below.

Applicant provides the following alphabetical list of independent third-party laboratories and universities that conducted the experiments and generated the scientific data relied upon and discussed in the analytical studies that follow this list:

Advanced Research - Pirelli Labs, Milan, Italy

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[124] See U.S. App'n Ser. Nos. 09/110,678 and 09/362,693.

Aero Propulsion and Power Directorate, Wright Laboratory, Air Force Material Command (ASC), Wright-Patterson Air Force Base

Atomic Energy Canada Limited, Chalk River Laboratories

Brookhaven National Laboratory

Charles Evans & Associates, Sunnyvale, CA

Charles Evans East, East Windsor, NJ

Environmental Catalysis and Materials Laboratory of Virginia Polytechnic Institute

Franklin and Marshall College

Galbraith Laboratories, Inc., Knoxville, TN

Grace Davison, Columbia, MD

IC Laboratories, Amawalk, NY

Idaho National Engineering Laboratory

Institut für Niedertemperatur-Plasmaphysik e.V. (INP Greifswald, Germany)

Jobin Yvon Inc., Edison, NJ

Laboratory for Electrochemistry of Renewed Electrode-Solution Interface (LEPGER)

Liebert Corporation, Division of Emerson Corporation

Los Alamos National Laboratory

Material Testing Laboratory, Pennington, NJ

MIT Lincoln Laboratories

Moscow Power Engineering Institute

NASA Lewis

National Research Council of Canada

PacifiCorp

Pennsylvania State University Chemical Engineering Department

Perkin-Elmer Biosystems, Framingham, MA

Pirelli Labs, Milan, Italy

Ricerca, Inc., Painesville, Ohio

Rider University, Lawrenceville NJ

Rowan University Professors A. J. Marchese, P. M. Jansson, J. L. Schmalzel

Ruhr University, Bochum, Germany

Shrader Analytical & Consulting Laboratories

Spectral Data Services, Inc., Champaign, IL

S. S. W., University of Western Ontario, Canada

Surface Science Laboratories, Mountain View, CA

Thermacore, Inc., Lancaster, PA

University of Delaware, Wilmington, DE

University of Massachusetts Amherst, Amherst, MA

University of New Mexico

Westinghouse Electric Corporation

Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA

The following 51 abstracts briefly describe the analytical studies of the scientific data generated by these independent third parties (highlighted in underline).

Independent Test Results

51. **J. Phillips, C-K Chen, R. Mills, "Evidence of catalytic Production of Hot Hydrogen in RF Generated Hydrogen/Argon Plasmas", IEEE Transactions on Plasma Science, submitted.**

J. Phillips, Distinguished National Laboratory Professor at Los Alamos National Laboratory and University of New Mexico, performed verification studies of line broadening in catalysis plasmas. This is the third in a series of papers by our team on apparently anomalous Balmer series line broadening in hydrogen containing RF generated, low pressure (< 600 mTorr) plasmas. In this paper the selective broadening of the atomic hydrogen lines in pure H2 and Ar/H2 mixtures in a large "GEC" cell (36 cm length X 14 cm ID) was mapped as a function of position, H2/Ar ratio, time, power, and pressure. Several observations regarding the selective line broadening were particularly notable as they are unanticipated on the basis of earlier models. First, the anomalous broadening of the Balmer lines was found to exist throughout the plasma, and not just in the region between the electrodes. Second, the broadening was consistently a complex function of the operating parameters particularly gas composition (highest in pure H2) position, power and pressure. Clearly not anticipated by earlier models were the findings that under some conditions the highest concentration of "hot" (>10 eV) hydrogen was found at the entry end, and not in the high field region between the electrodes and that in other conditions, the hottest H was at the (exit) pump (also grounded electrode) end. Third, excitation and electron temperatures were less than one eV in all regions of the plasma not directly adjacent (>1mm) to the electrodes, providing additional evidence that the energy for broadening, contrary to standard models, is not obtained from the field. Fourth, in contrast to our earlier studies of hydrogen/helium and water plasmas, we found that in some conditions 98% of the atomic hydrogen was in the "hot" state throughout the GEC cell. Virtually every operating parameter studied impacted the character of the hot H atom population, and clearly second and third order effects exist, indicating a need for experimental design. Some non-field mechanisms for generating hot hydrogen atoms, specifically those suggested by Mills' CQM model, are outlined.

50. **J. Phillips, C. K. Chen, R. Mills, "Evidence of the Production of Hot Hydrogen Atoms in RF Plasmas by Catalytic Reactions Between Hydrogen and Oxygen Species", Journal Plasma Physics, submitted.**

J. Phillips, Distinguished National Laboratory Professor at Los Alamos National Laboratory and University of New Mexico, performed verification studies of line broadening in catalysis plasmas. Selective H-atom line broadening was found to be present throughout the volume (13.5 cm ID x 38 cm length) of RF generated H_2O plasmas in a GEC cell. Notably, at low pressures (ca. <0.08 Torr), a significant fraction (ca. 20%) of the atomic hydrogen was 'hot' with energies greater than 40 eV with a pressure dependence, but only a weak power dependence. The degree of broadening was virtually independent of the position studied within the GEC cell, similar to the recent finding for He/H_2 plasmas in the same GEC cell. In contrast to the atomic hydrogen lines, no broadening was observed in oxygen species lines at low pressures. Also, in 'control' Xe/H_2 plasmas run in the same cell at similar pressures and adsorbed power, no significant broadening of atomic hydrogen, Xe, or any other lines was observed. Stark broadening or acceleration of charged species due to high electric fields can not explain the results since i) the electron density was insufficient by orders of magnitude, ii) the RF field was essentially confined to the cathode fall region in contrast to the broadening that was independent of position, and iii) only the atomic hydrogen lines were broadened. Rather, all of the data is consistent with a model that claims specific, predicted, species can act catalytically through a resonant energy transfer mechanism to create 'hot' hydrogen atoms in plasmas.

49. **R. L. Mills, Y. Lu, B. Dhandapani, "Spectral Identification of $H_2(1/2)$", submitted.**

Lower-energy molecular hydrogen lines were independently recorded and interpreted by Stephan Fuelling of the University of Nevada, Reno and the Nevada Terawatt Facility and provided to BlackLight. Novel emission lines with energies of $q \cdot 13.6\,eV$ where $q = 1,2,3,4,6,7,8,9,\ or\ 11$ were previously observed by extreme ultraviolet (EUV) spectroscopy recorded on microwave discharges of helium with 2%

hydrogen [R. L. Mills, P. Ray, J. Phys. D, Applied Physics, Vol. 36, (2003), pp. 1535-1542]. These lines matched $H(1/p)$, fractional Rydberg states of atomic hydrogen wherein $n=\frac{1}{2},\frac{1}{3},\frac{1}{4},...,\frac{1}{p}$; ($p \leq 137$ is an integer) replaces the well known parameter $n = \text{integer}$ in the Rydberg equation for hydrogen excited states. Evidence supports that these states are formed by a resonant nonradiative energy transfer to He^+ acting as a catalyst; whereas, krypton, xenon, and their ions serve as controls. Two $H(1/2)$ may react to form $H_2(1/2)$ with emission of the bond energy from a resonant state within its transition state with vibration-rotational energies that are the same as those of H_2. A series of vibration-rotational bands in the 60-67 nm region, a high-energy region for which vibration-rotational spectra are ordinarily unknown, was observed from low-pressure helium-hydrogen (99/1%) microwave plasmas that matched the predicted energy spacing of the vibrational energy of H_2 about the bond energy of $H_2(1/2)$ corresponding to the reaction $2H(1/2) \rightarrow H_2(1/2)$.

48. **J. Phillips, C. K. Chen, T. Shiina, "Evidence of Catalytic Production of Hot Atomic Hydrogen in RF Hydrogen/Helium Generated Plasmas", IEEE Transactions Plasma Science, submitted.**

A study of the line shapes of hydrogen Balmer series lines in RF generated low pressure H_2/He plasmas performed at the University of New Mexico, Department of Chemical and Nuclear Engineering produced results suggesting a catalytic process between helium and hydrogen species results in the generation of 'hot' (ca. 28 eV) atomic hydrogen. Even far from the electrodes (ca. 15 cm) both 'cold' (<2.5 eV) and 'hot' atomic hydrogen were found in H_2/He plasmas. Line shapes, relative line areas of cold and hot atomic hydrogen (hot/cold>2.5), were very similar for areas between the electrodes and far from the electrodes for these plasmas. In contrast, in H_2/Xe only 'warm' (<5 eV) hydrogen (warm/cold<1.0) was found between the electrodes, and only cold hydrogen away from the electrodes. Earlier postulates that preferential hydrogen line broadening in plasmas results from the acceleration of ionic hydrogen in the vicinity of electrodes, and the special charge exchange characteristics of Ar/H_2^+ are clearly

belied by the present results that show atomic hydrogen line shape are similar for H_2/He plasmas throughout the relatively large cylindrical (14 cm ID x 36 cm length) cavity.

47. **R. L. Mills, P. Ray, M. Nansteel, J. He, X. Chen, A. Voigt, B. Dhandapani, Luca Gamberale, "Energetic Catalyst-Hydrogen Plasma Reaction as a Potential New Energy Source", Central European Journal of Physics, submitted.**

Luca Gamberale of the Advanced Research - Pirelli Labs, Milan, Italy performed verification studies as a visiting researcher at BlackLight Power, Cranbury, NJ. The prior reported results of BlackLight Power, Inc. of a chemically generated hydrogen plasma, extraordinarily broadened atomic hydrogen lines, lower-energy hydrogen molecular-ion lines, the isolation and characterization of lower-energy molecular hydrogen gas, and excess power measured by water bath calorimetry were replicated. Specifically, plasmas of certain catalysts such as Sr^+, Ar^+, and He^+ mixed with hydrogen were studied for evidence of a novel energetic reaction. A hydrogen plasma was observed to form at low temperatures (e.g. $\approx 10^3\ K$) and an extraordinary low field strength of about 1-2 V/cm when argon and strontium were present with atomic hydrogen. RF and microwave plasmas were used to generate He^+ and Ar^+ catalysts. Extraordinarily fast H (40-50 eV) was observed by Balmer α line broadening only from plasmas having a catalyst with H. Novel emission lines with energies of $q \cdot 13.6\ eV$ where $q = 1,2,3,4,6,7,8,9,\ or\ 11$ were previously observed by extreme ultraviolet (EUV) spectroscopy recorded on microwave discharges of helium with 2% hydrogen [R. L. Mills, P. Ray, J. Phys. D, Applied Physics, Vol. 36, (2003), pp. 1535-1542]. These lines matched $H(1/p)$, fractional Rydberg states of atomic hydrogen wherein $n = \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, ..., \frac{1}{p}$; ($p \leq 137$ is an integer) replaces the well known parameter $n = \text{integer}$ in the Rydberg equation for hydrogen excited states. $H(1/p)$ may react with a proton and two $H(1/p)$ may react to form $H_2(1/p)^+$ and $H_2(1/p)$, respectively, that have vibrational and rotational energies that are p^2 times those of the species comprising uncatalyzed atomic hydrogen. A series of over twenty peaks in the 10-65 nm region emitted from low-pressure helium-hydrogen (90/10%) and argon-hydrogen (90/10%) microwave

plasmas matched the energy spacing of 2^2 times the transition-state vibrational energy of H_2^+ with the series ending on the bond energy of $H_2(1/4)^+$. $H_2(1/p)$ gas was isolated by liquefaction using an high-vacuum (10^{-6} Torr) capable, liquid nitrogen cryotrap and was characterized by gas chromatography (GC), mass spectroscopy (MS), visible and EUV optical emission spectroscopy (OES), and ^1H NMR of the condensable gas dissolved in $CDCl_3$. Novel peaks were observed by cryogenic gas chromatography performed on the condensable gas which was highly pure hydrogen by MS and had a higher ionization energy than H_2. The observation that the EUV emission spectrum changed with deuterium substitution in a region where no hydrogen emission has ever been observed further supported the existence of lower-energy molecular hydrogen. Contaminants and exotic helium-hydrogen species were eliminated as the source of the reaction and condensed gas plasma emission spectra. Upfield shifted NMR peaks were observed at 3.47 ppm and 2.18 ppm compared to that of H_2 at 4.63 ppm that matched $H_2(1/2)$ and $H_2(1/4)$, respectively. Excess power was absolutely measured from the helium-hydrogen plasma. For an input of 44.3 W, the total plasma power of the helium-hydrogen plasma measured by water bath calorimetry was 62.9 W corresponding to 18.6 W of excess power in 3 cm^3. The excess power density and energy balance were high, 6.2 W/cm^3 and $-5\,X\,10^4$ $kJ/mole\ H_2$ ($240\ eV/H\ atom$), respectively.

46. **R. L. Mills, Y. Lu, J. He, M. Nansteel, P. Ray, X. Chen, A. Voigt, B. Dhandapani, "Spectral Identification of New States of Hydrogen", New Journal of Chemistry, submitted.**

Novel emission lines with energies of $q \cdot 13.6\ eV$ where $q = 1,2,3,4,6,7,8,9,11$ were previously observed by extreme ultraviolet (EUV) spectroscopy recorded on microwave discharges of helium with 2% hydrogen [R. L. Mills, P. Ray, J. Phys. D, Applied Physics, Vol. 36, (2003), pp. 1535-1542]. These lines matched $H(1/p)$, fractional Rydberg states of atomic hydrogen wherein $n = \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, ..., \frac{1}{p}$; ($p \le 137$ is an integer) replaces the well known parameter $n = \text{integer}$ in the Rydberg equation for hydrogen excited states. Evidence supports that these states are formed by a resonant nonradiative energy

transfer to He^+ acting as a catalyst. Ar^+ also serves as a catalyst to form $H(1/p)$; whereas, krypton, xenon, and their ions serve as controls. $H(1/p)$ may react with a proton and two $H(1/p)$ may react to form $H_2(1/p)^+$ and $H_2(1/p)$, respectively, that have vibrational and rotational energies that are p^2 times those of the species comprising uncatalyzed atomic hydrogen. A series of over twenty peaks in the 10-65 nm region emitted from low-pressure helium-hydrogen (90/10%) and argon-hydrogen (90/10%) microwave plasmas matched the energy spacing of 2^2 times the transition-state vibrational energy of H_2^+ with the series ending on the bond energy of $H_2(1/4)^+$. Rotational lines were observed in the 145-300 nm region from atmospheric pressure electron-beam excited argon-hydrogen plasmas. The unprecedented energy spacing of 4^2 times that of hydrogen established the internuclear distance as 1/4 that of H_2 and identified $H_2(1/4)$. The results were independently recorded at Rutgers University. $H_2(1/p)$ gas was isolated by liquefaction at liquid nitrogen temperature and by decomposition of compounds found to contain the corresponding hydride ions $H^-(1/p)$. The $H_2(1/p)$ gas was dissolved in $CDCl_3$ and characterized by ^1H NMR at Rider University, Lawrenceville NJ. Considering solvent effects, singlet peaks upfield of H_2 were observed with a predicted integer spacing of 0.64 ppm at 3.47, 3.02, 2.18, 1.25, 0.85, and 0.22 ppm which matched the consecutive series $H_2(1/2)$, $H_2(1/3)$, $H_2(1/4)$, $H_2(1/5)$, $H_2(1/6)$, and $H_2(1/7)$, respectively. Excess power was absolutely measured from the helium-hydrogen plasma. For an input of 41.9 W, the total plasma power of the helium-hydrogen plasma measured by water bath calorimetry was 62.1 W corresponding to 20.2 W of excess power in 3 cm^3 plasma volume. The excess power density and energy balance were high, $6.7\ W/cm^3$ and $-5.4\ X10^4\ kJ/mole\ H_2$ ($280\ eV/H\ atom$), respectively. In addition to power applications, battery and propellant reactions are proposed that may be transformational, and observed excited vibration-rotational levels of $H_2(1/4)$ could be the basis of a UV laser that could significantly advance photolithography.

45. **Dr. K.D. Keefer, Report on BlackLight Power Technology: Its Apparent Scientific Basis, State of Development and Stability for Commercialization by Liebert Corporation, (2001), and, Report on BlackLight Power Technology: Its Apparent Scientific Basis, State of Development and Stability for Commercialization, (2002).**

To separate reports disclosing the results of NMR, ToF-SIMS, XPS identification of novel hydrino hydride compounds and analysis of chemically-produced plasma by an expert hired by the Liebert Corporation, a division of the well-known and highly-respected Emerson Corporation. According to the expert's own words, he "observed demonstrations of the BlackLight Power (BLP) process and ...reached the inescapable conclusion that it is based on extraordinary chemical reactions that seem to release extraordinary amounts of energy.... It is [his] professional opinion that the BLP process represents a chemical conversion of atomic hydrogen unlike any previously reported [in] the archival scientific literature." Although the expert states that he was skeptical of Applicant's theory, he admitted that the chemical and plasma data did support Applicant's fractional quantum states and that he could offer no other explanation of the data using conventional quantum theory.

44. **A. J. Marchese, P. M. Jansson, J. L. Schmalzel, "The BlackLight Rocket Engine", Phase I Final Report, NASA Institute for Advanced Concepts Phase I, May 1-November 30, 2002, http://www.niac.usra.edu/files/studies/final_report/pdf/752Marchese.pdf.**

Rowan University Professors A. J. Marchese, P. M. Jansson, J. L. Schmalzel performed verification studies as visiting researchers at BlackLight Power, Cranbury, NJ. The prior reported results of BlackLight Power, Inc. of extraordinarily broadened atomic hydrogen lines, population inversion, lower-energy hydrogen lines, and excess power measured by water bath calorimetry were replicated. The application of the energetic hydrogen to propulsion was studied.

Specifically, the data supporting hydrinos was replicated. See

i.) BlackLight Process Theory (pp. 10-12) which gives the theoretical energy levels for hydrinos and the catalytic reaction to form hydrinos,

ii.) Unique Hydrogen Line Broadening in Low Pressure Microwave Water Plasmas (pp. 25-27, particularly Fig. 21) which shows that in the same microwave cavity driven at the same power, the temperature of the hydrogen atoms in the microwave plasma where the hydrino reaction was active was 50 times that of the control based on the spectroscopic line widths,

iii.) Inversion of the Line Intensities in Hydrogen Balmer Series (pp. 27-28, particularly Fig. 22) which shows for the first time in 40 years of intensive worldwide research that atomic hydrogen population inversion was achieved in a steady state plasma and supports the high power released from the reaction of hydrogen to form hydrinos,

iv.) Novel Vacuum Ultraviolet (VUV) Vibration Spectra of Hydrogen Mixture Plasmas (pp. 28-29, particularly Fig. 23) which shows a novel vibrational series of lines in a helium-hydrogen plasmas at energies higher than any known vibrational series and it identically matches the theoretical prediction of 2 squared times the corresponding vibration of the ordinary hydrogen species, and

v.) Water Bath Calorimetry Experiments Showing Increased Heat Generation (pp. 29-30, particularly Fig. 25) that shows that with exactly the same system and same input power, the heating of the water reservoir absolutely measured to 1% accuracy was equivalent to 55 to 62 W with the catalyst-hydrogen mixture compared to 40 W in the control without the possibility of the reaction to form hydrinos.

43. **J. Phillips, R. L. Mills, X. Chen, "Water Bath Calorimetric Study of Excess Heat in 'Resonance Transfer' Plasmas", Journal of Applied Physics, Vol. 96, No. 6, pp. 3095-3102.**

J. Phillips, Distinguished National Laboratory Professor at Los Alamos National Laboratory and University of New Mexico, performed verification studies as a visiting researcher at BlackLight Power, Cranbury, NJ. Water bath calorimetry was used to demonstrate one more peculiar phenomenon associated with a certain class of mixed gas plasmas termed resonant transfer, or rt-plasmas. Specifically, He/H_2(10%) (500 mTorr), Ar/H_2(10%) (500 mTorr), and $H_2O(g)$ (500 mTorr and 200 mTorr) plasmas

generated with an Evenson microwave cavity consistently yielded on the order of 50% more heat than non rt-plasma (controls) such as He, Kr, Kr/H_2(10%), under identical conditions of gas flow, pressure, and microwave operating conditions. The excess power density of rt-plasmas was of the order $10\ W \cdot cm^{-3}$. In earlier studies with these same rt-plasmas it was demonstrated that other unusual features were present including dramatic broadening of the hydrogen Balmer series lines, unique vacuum ultraviolet (VUV) lines, and in the case of water plasmas, population inversion of the hydrogen excited states. Both the current results and the earlier results are completely consistent with the existence of a hitherto unknown exothermic chemical reaction, such as that predicted by Mills, occurring in rt-plasmas.

42. **R. L. Mills, P. C. Ray, R. M. Mayo, M. Nansteel, B. Dhandapani, J. Phillips, "Spectroscopic Study of Unique Line Broadening and Inversion in Low Pressure Microwave Generated Water Plasmas", J. Plasma Phys. Vol. 71, (2005), pp. 877-88.**

J. Phillips, Distinguished National Laboratory Professor at Los Alamos National Laboratory and University of New Mexico, performed verification studies as a visiting researcher at BlackLight Power, Cranbury, NJ. It was demonstrated that low pressure (~ 0.2 Torr) water vapor plasmas generated in a 10 mm ID quartz tube with an Evenson microwave cavity show at least two features which are not explained by conventional plasma models. First, significant (> 2.5 Å) hydrogen Balmer α line broadening was recorded, of constant width, up to 5 cm from the microwave coupler. Only hydrogen, and not oxygen, showed significant line broadening. This feature, observed previously in hydrogen-containing mixed gas plasmas generated with high voltage DC and RF discharges was explained by some researchers to result from acceleration of hydrogen ions near the cathode. This explanation cannot apply to the line broadening observed in the (electrodeless) microwave plasmas generated in this work, particularly at distances as great as 5 cm from the microwave coupler. Second, dramatic inversion of the line intensities of both the Lyman and Balmer series, again, at distances up to 5 cm from the coupler were observed. The dramatic line inversion suggests the existence of a hitherto unknown source of pumping of the optical power in plasmas. Finally, it is

notable that other aspects of the plasma including the OH^* rotational temperature and low electron concentrations are quite typical of plasmas of this type.

41. **H. Conrads, R. Mills, Th. Wrubel, "Emission in the Deep Vacuum Ultraviolet from a Plasma Formed by Incandescently Heating Hydrogen Gas with Trace Amounts of Potassium Carbonate", Plasma Sources Science and Technology, Vol. 12, (2003), pp. 389-395.**

The generation of a hydrogen plasma with intense extreme ultraviolet and visible emission was observed at Ruhr University, Bochum, Germany from low pressure hydrogen gas (0.1-1 mbar) in contact with a hot tungsten filament only when the filament heated a titanium dissociator coated with K_2CO_3 above 750°C. The dissociator was electrically floated, and the electric field strength from the filament was about 1 V/cm, two orders of magnitude lower than the starting voltages measured for gas glow discharges. The emission of the H_α and H_β transitions as well as the L_α and L_β transitions were recorded and analyzed. The plasma seemed to be far from thermal equilibrium, and no conventional mechanism was found to explain the formation of a hydrogen plasma by incandescently heating hydrogen gas with the presence of trace amounts of K_2CO_3. The temporal behavior of the plasma was recorded via hydrogen Balmer alpha line emission when all power into the cell was terminated. A two second decay of the plasma was observed after a fast decay of the electric field to zero. The plasma was found to be dependent on the chemistry of atomic hydrogen with potassium since no plasma formed with Na_2CO_3 replacing K_2CO_3 and the time constant of the emission following the removal of all of the power to the cell matched that of the cooling of the filament and the resulting shift from atomic to molecular hydrogen. Our results indicate that a novel chemical power source is present that forms the energetic hydrogen plasma. The plasma is a potential new light source.

40. **R. Mills, "Observation of Extreme Ultraviolet Emission from Hydrogen-KI Plasmas Produced by a Hollow Cathode Discharge", Int. J. Hydrogen Energy, Vol. 26, No. 6, (2001), pp. 579-592.**

A high voltage discharge of hydrogen with and without the presence of a source of potassium, potassium iodide, in the discharge was performed at Institut für Niedertemperatur-Plasmaphysik e.V. (INP Greifswald, Germany) with a hollow cathode. It has been reported that intense extreme ultraviolet (EUV) emission was observed at low temperatures (e.g. $< 10^3\ K$) from atomic hydrogen and certain atomized elements or certain gaseous ions which ionize at integer multiples of the potential energy of atomic hydrogen, $27.2\ eV$ [1, 3-5]. Two potassium ions or a potassium atom may each provide an electron ionization or transfer reaction that has a net enthalpy equal to an integer multiple of $27.2\ eV$. The spectral lines of atomic hydrogen were intense enough to be recorded on photographic films only when KI was present. EUV lines not assignable to potassium, iodine, or hydrogen were observed at 73.0, 132.6, 513.6, 677.8, 885.9, and 1032.9 Å. The lines are assigned to transitions of atomic hydrogen to lower energy levels corresponding to lower energy hydrogen atoms called hydrino atoms and the emission from the excitation of the corresponding hydride ions formed from the hydrino atoms.

39. **R. Mills, "Temporal Behavior of Light-Emission in the Visible Spectral Range from a Ti-K_2CO_3-H-Cell', Int. J. Hydrogen Energy, Vol. 26, No. 4, (2001), pp. 327-332.**

Institut für Niedertemperatur-Plasmaphysik e.V. (INP Greifswald, Germany) reports the generation of a hydrogen plasma and extreme ultraviolet emission as recorded via the hydrogen Balmer emission in the visible range. Typically a hydrogen plasma is generated and the emission of extreme ultraviolet light from hydrogen gas is achieved via a discharge at high voltage, a high power inductively coupled plasma, or a plasma created and heated to extreme temperatures by RF coupling (e.g. $> 10^6\ K$) with confinement provided by a toroidal magnetic field. The observed plasma formed at low temperatures (e.g. $\approx 10^3\ K$) from atomic hydrogen generated at a tungsten filament that heated a titanium dissociator coated with potassium carbonate. The temporal behavior of the plasma was recorded via hydrogen Balmer alpha line emission when all power into the cell was terminated. A two second decay of the plasma was observed after a

fast decay of the electric field to zero. The persistence of emission following the removal of all of the power to the cell indicates that a novel chemical power source is present that forms an energetic plasma in hydrogen. No unusual behavior was observed with the control sodium carbonate.

38. **R. Mills, J. Sankar, A. Voigt, J. He, P. Ray, B. Dhandapani, "Synthesis and Characterization of Diamond Films from MPCVD of an Energetic Argon-Hydrogen Plasma and Methane", Materials Science, submitted.**

Polycrystalline diamond films were synthesized on silicon substrates by a low power (~80 W) microwave plasma chemical vapor deposition (MPCVD) reaction of a mixture of argon-hydrogen-methane (17.5/80/2.5%). The films were characterized by time of flight secondary ion mass spectroscopy (ToF-SIMS), X-ray photoelectron spectroscopy (XPS) (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA), Raman spectroscopy (Charles Evans & Associates, Sunnyvale, CA), scanning electron microscopy (SEM) (S. S. W., University of Western Ontario, Canada), and X-ray diffraction (XRD) (IC Laboratories, Amawalk, NY). It is proposed that Ar^+ served as a catalyst with atomic hydrogen to form an energetic plasma. CH, C_2, and C_3 emissions were observed with significantly broadened H α line. The average hydrogen atom temperature of a argon-hydrogen-methane plasma was measured to be $110-130\ eV$ versus $\approx 3\ eV$ for pure hydrogen. Bombardment of the carbon surface by highly energetic hydrogen formed by the catalysis reaction may play a role in the formation of diamond. Then, by this novel pathway, the relevance of the CO tie line is eliminated along with other stringent conditions and complicated and inefficient techniques which limit broad application of the versatility and superiority of diamond thin film technology.

37. **R. Mills, P. Ray, B. Dhandapani, W. Good, P. Jansson, M. Nansteel, J. He, A. Voigt, "Spectroscopic and NMR Identification of Novel Hydride Ions in Fractional Quantum Energy States Formed by an Exothermic Reaction of Atomic Hydrogen with Certain Catalysts", European Physics Journal: Applied Physics, Vol. 28, (2004), pp. 83-104.**

$2K^+$ to $K + K^{2+}$ and K to K^{3+} provide a reaction with a net enthalpy equal to the one and three times the potential energy of atomic hydrogen, respectively. The presence of these gaseous ions or atoms with thermally dissociated hydrogen formed a so-called resonance transfer (rt) plasma having strong VUV emission with a stationary inverted Lyman population. Significant line broadening of the Balmer α, β, and γ lines of 18 eV was observed, compared to 3 eV from a hydrogen microwave plasma. Emission from rt-plasmas occurred even when the electric field applied to the plasma was zero as recorded at Institut für Niedertemperatur-Plasmaphysik e.V. (INP Greifswald, Germany. The reaction was exothermic since excess power of 20 $mW \cdot cm^{-3}$ was measured by Calvet calorimetry. An energetic catalytic reaction was proposed involving a resonant energy transfer between hydrogen atoms and $2K^+$ or K to form very stable novel hydride ions $H^-(1/p)$ called hydrino hydrides having a fractional principal quantum numbers $p = 2$ and $p = 4$, respectively. Characteristic emission was observed from K^{2+} and K^{3+} that confirmed the resonant nonradiative energy transfer of $27.2\ eV$ and $3 \cdot 27.2\ eV$ from atomic hydrogen to $2K^+$ and K, respectively.

The predicted binding energy of $H^-(1/2)$ of $3.0471\ eV$ with the fine structure was observed at 4071 Å, and its predicted bound-free hyperfine structure lines $E_{HF} = j^2 3.00213\ X\ 10^{-5} + 3.0563\ eV$ (j is an integer) matched those observed for $j = 1$ to $j = 37$ to within a 1 part per 10^4. $H^-(1/4)$ was observed spectroscopically at $110\ nm$ corresponding to its predicted binding energy of $11.2\ eV$. The ^1H MAS NMR spectrum (Spectral Data Services, Inc., Champaign, IL) of novel compound $KH*Cl$ relative to external tetramethylsilane (TMS) showed a large distinct upfield resonance at -4.4 corresponding to an absolute resonance shift of -35.9 ppm that matched the theoretical prediction of p = 4. A novel NMR (Grace Davison, Columbia, MD and Spectral Data Services, Inc., Champaign, IL) peak of $KH*I$ at -1.5 ppm relative to TMS corresponding to an absolute resonance shift of -33.0 ppm matched the theoretical prediction of p = 2. The predicted catalyst reactions, position of the upfield-shifted NMR peaks, and spectroscopic data for $H^-(1/2)$ and $H^-(1/4)$ were found to be in agreement.

36. **R. L. Mills, P. Ray, B. Dhandapani, J. He, "Novel Liquid-Nitrogen-Condensable Molecular Hydrogen Gas", Acta Physica Polonica A, submitted.**

Extreme ultraviolet (EUV) spectroscopy was recorded on microwave discharges of helium with 2% hydrogen. Novel emission lines were observed with energies of $q \cdot 13.6\,eV$ where $q = 1,2,3,4,6,7,8,9,11$ or these discrete energies less $21.2\,eV$ corresponding to inelastic scattering of these photons by helium atoms due to excitation of $He\,(1s^2)$ to $He\,(1s^1 2p^1)$. These lines matched $H(1/p)$, fractional Rydberg states of atomic hydrogen, formed by a resonant nonradiative energy transfer to He^+. Corresponding emission due to the reaction $2H(1/2) \rightarrow H_2(1/2)$ with vibronic coupling at $E_{D+vib} = p^2 E_{D\,H_2} \pm \left(\frac{\upsilon^*}{3}\right) E_{vib\,H_2(\upsilon=0\rightarrow\upsilon=1)}$, $\upsilon^* = 1,2,3...$ was observed at the longer wavelengths for $\upsilon^* = 2$ to $\upsilon^* = 32$ and at the shorter wavelengths for $\upsilon^* = 1$ to $\upsilon^* = 16$ where $E_{D\,H_2}$ and $E_{vib\,H_2(\upsilon=0\rightarrow\upsilon=1)}$ are the experimental bond and vibrational energies of H_2, respectively. Fractional-principal-quantum-level molecular hydrogen $H_2(1/p)$ gas was isolated by liquefaction using an ultrahigh-vacuum, liquid nitrogen cryotrap and was characterized by gas chromatography (GC), mass spectroscopy (MS), optical emission spectroscopy (OES), and ^1H NMR (Rider University, Lawrenceville NJ) of the condensable gas dissolved in $CDCl_3$. The condensable gas was highly pure hydrogen by GC and MS and had a higher ionization energy than H_2. An upfield shifted NMR peaks were observed at 3.47 and 2.18 ppm compared to that of H_2 at 4.63 ppm. A theoretical rocketry propellant reaction is given that may be transformational.

35. **R. L. Mills, J. Sankar, A. Voigt, J. He, B. Dhandapani, "Spectroscopic Characterization of the Atomic Hydrogen Energies and Densities and Carbon Species During Helium-Hydrogen-Methane Plasma CVD Synthesis of Single Crystal Diamond Films", Chemistry of Materials, Vol. 15, (2003), pp. 1313-1321.**

Polycrystalline diamond films were synthesized on silicon substrates for the first time without diamond seeding by a very low power (38 W) microwave plasma continuous vapor deposition (MPCVD) reaction of a mixture of helium-hydrogen-

methane (48.2/48.2/3.6%). The films were characterized by time of flight secondary ion mass spectroscopy (ToF-SIMS), X-ray photoelectron spectroscopy (XPS) (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA), Raman spectroscopy (Charles Evans & Associates, Sunnyvale, CA and Jobin Yvon Inc., Edison, NJ), scanning electron microscopy (SEM) (S. S. W., University of Western Ontario, Canada and Material Testing Laboratory, Pennington, NJ), and X-ray diffraction (XRD) (IC Laboratories, Amawalk, NY). It is proposed that He^+ served as a catalyst with atomic hydrogen to form an energetic plasma. CH, C_2, and C_3 emissions were observed with significantly broadened H α, β, γ, and δ lines. The average hydrogen atom temperature of a helium-hydrogen-methane plasma was measured to be $120 - 140\ eV$ versus $\approx 3\ eV$ for pure hydrogen. Bombardment of the carbon surface by highly energetic hydrogen formed by the catalysis reaction may play a role in the formation of diamond. Then, by this novel pathway, the relevance of the CO tie line is eliminated along with other stringent conditions and complicated and inefficient techniques which limit broad application of the versatility and superiority of diamond thin film technology.

34. **R. L. Mills, J. Sankar, A. Voigt, J. He, B. Dhandapani, "Low Power MPCVD of Diamond Films on Silicon Substrates", Journal of Vacuum Science & Technology A, submitted.**

Polycrystalline diamond films were synthesized on silicon substrates for the first time without diamond seeding by a very low power (38 W) microwave plasma continuous vapor deposition (MPCVD) reaction of a mixture of 10-30% hydrogen, 90-70% helium, and 1-10% CH_4. The films were characterized by time of flight secondary ion mass spectroscopy (ToF-SIMS), X-ray photoelectron spectroscopy (XPS) (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA), Raman spectroscopy (Charles Evans & Associates, Sunnyvale, CA), scanning electron microscopy (SEM) (S. S. W., University of Western Ontario, Canada and Material Testing Laboratory, Pennington, NJ), and X-ray diffraction (XRD) (IC Laboratories, Amawalk, NY). It is proposed that He^+ served as a catalyst with atomic

hydrogen to form an energetic plasma. The average hydrogen atom temperature was measured to be $180-210\ eV$ versus $\approx 3\ eV$ for pure hydrogen. The electron temperature T_e for helium-hydrogen was 28,000 K compared to 6800 K for pure helium. Bombardment of the carbon surface by highly energetic hydrogen formed by the catalysis reaction may play a role in the formation of diamond. Then, by this novel pathway, the relevance of the CO tie line is eliminated along with other stringent conditions and complicated and inefficient techniques which limit broad application of the versatility and superiority of diamond thin film technology.

33. **R. L. Mills, A. Voigt, B. Dhandapani, J. He, "Synthesis and Spectroscopic Identification of Lithium Chloro Hydride", Materials Characterization, submitted.**

A novel inorganic hydride compound, lithium chloro hydride ($LiHCl$), which comprises a high binding energy hydride ion was synthesized by reaction of atomic hydrogen with potassium metal and lithium chloride. Lithium chloro hydride was identified by time of flight secondary ion mass spectroscopy, X-ray photoelectron spectroscopy (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA), ^1H nuclear magnetic resonance spectroscopy (Spectral Data Services, Inc., Champaign, IL), and powder X-ray diffraction (IC Laboratories, Amawalk, NY). Hydride ions with increased binding energies may form many novel compounds with broad applications such as the oxidant of a high voltage battery.

32. **R. L. Mills, B. Dhandapani, J. He, "Highly Stable Amorphous Silicon Hydride", Solar Energy Materials & Solar Cells, Vol. 80, No. 1, (2003), pp. 1-20.**

A novel highly stable hydrogen terminated silicon coating was synthesized by microwave plasma reaction of mixture of silane, hydrogen, and helium wherein it is proposed that He^+ served as a catalyst with atomic hydrogen to form highly stable silicon hydrides. Novel silicon hydride was identified by time of flight secondary ion mass spectroscopy and X-ray photoelectron spectroscopy. The time of flight secondary ion mass spectroscopy (ToF-SIMS) identified the coatings as hydride by the large SiH^+

peak in the positive spectrum and the dominant H^- in the negative spectrum. Since hydrogen is the only element with no primary element peaks, X-ray photoelectron spectroscopy (XPS) (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA) identified the H content of the SiH coatings as comprising novel silicon hydrides due to new peaks at 11, 43, and 55 eV in the absence of corresponding peaks of any candidate element at higher binding energies. The silicon hydride surface was remarkably stable to air as shown by XPS. The highly stable amorphous silicon hydride coating may advance the production of integrated circuits and microdevices by resisting the oxygen passivation of the surface and possibly altering the dielectric constant and band gap to increase device performance.

31. **R. L. Mills, J. Sankar, A. Voigt, J. He, B. Dhandapani, "Synthesis of HDLC Films from Solid Carbon", J. of Material Science, Vol. 39 (2004), pp. 3309-18.**

Diamond-like carbon (DLC) films were synthesized on silicon substrates from solid carbon by a very low power (~60 W) microwave plasma chemical vapor deposition (MPCVD) reaction of a mixture of 90-70% helium and 10-30% hydrogen. It is proposed that He^+ served as a catalyst with atomic hydrogen to form an energetic plasma. The average hydrogen atom temperature of a helium-hydrogen plasma was measured to be $180-210\ eV$ versus $\approx 3\ eV$ for pure hydrogen. Bombardment of the carbon surface by highly energetic hydrogen formed by the catalysis reaction may play a role in the formation of DLC. The films were characterized by time of flight secondary ion mass spectroscopy (ToF-SIMS), X-ray photoelectron spectroscopy (XPS) (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA), and Raman spectroscopy (Charles Evans & Associates, Sunnyvale, CA). TOF-SIMS identified the coatings as hydride by the large H^+ peak in the positive spectrum and the dominant H^- in the negative spectrum. The XPS identification of the H content of the CH coatings as a novel hydride corresponding to a peak at 49 eV has implications that the mechanism of the DLC formation may also involve one or both of selective etching of graphitic carbon and the stabilization of sp^3-bonded carbon by the hydrogen catalysis

product. Thus, a novel H intermediate formed by the plasma catalysis reaction may enhance the stabilization and etching role of H used in past methods.

30. **R. L. Mills, J. He, P. Ray, B. Dhandapani, X. Chen, "Synthesis and Characterization of a Highly Stable Amorphous Silicon Hydride as the Product of a Catalytic Helium-Hydrogen Plasma Reaction", Int. J. Hydrogen Energy, in press.**

A novel highly stable surface coating $SiH(1/p)$ which comprised high binding energy hydride ions was synthesized by a microwave plasma reaction of a mixture of silane, hydrogen, and helium wherein it is proposed that He^+ served as a catalyst with atomic hydrogen to form the highly stable hydride ions. Novel silicon hydride was identified by time of flight secondary ion mass spectroscopy and X-ray photoelectron spectroscopy. The time of flight secondary ion mass spectroscopy (ToF-SIMS) identified the coatings as hydride by the large SiH^+ peak in the positive spectrum and the dominant H^- in the negative spectrum. X-ray photoelectron spectroscopy (XPS) (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA) identified the H content of the SiH coatings as hydride ions, $H^-(1/4)$, $H^-(1/9)$, and $H^-(1/11)$ corresponding to peaks at 11, 43, and 55 eV, respectively. The silicon hydride surface was remarkably stable to air as shown by XPS. The highly stable amorphous silicon hydride coating may advance the production of integrated circuits and microdevices by resisting the oxygen passivation of the surface and possibly altering the dielectric constant and band gap to increase device performance.

The plasma which formed $SiH(1/p)$ showed a number of extraordinary features. Novel emission lines with energies of $q \cdot 13.6\ eV$ where $q = 1,2,3,4,6,7,8,9,\ or\ 11$ were previously observed by extreme ultraviolet (EUV) spectroscopy recorded on microwave discharges of helium with 2% hydrogen [R. Mills, P. Ray, "Spectral Emission of Fractional Quantum Energy Levels of Atomic Hydrogen from a Helium-Hydrogen Plasma and the Implications for Dark Matter", Int. J. Hydrogen Energy, Vol. 27, No. 3, pp. 301-322]. These lines matched $H(1/p)$, fractional Rydberg states of atomic hydrogen where p is an integer, formed by a resonant nonradiative energy transfer to

He^+ acting as a catalyst. The average hydrogen atom temperature of the helium-hydrogen plasma was measured to be $180\text{-}210\ eV$ versus $\approx 3\ eV$ for pure hydrogen. Using water bath calorimetry, excess power was observed from the helium-hydrogen plasma compared to control krypton plasma. For example, for an input of 8.1 W, the total plasma power of the helium-hydrogen plasma measured by water bath calorimetry was 30.0 W corresponding to 21.9 W of excess power in 3 cm^3. The excess power density and energy balance were high, $7.3\ W/cm^3$ and $-2.9\,X\,10^4\ kJ/mole\ H_2$, respectively. This catalytic plasma reaction may represent a new hydrogen energy source and a new field of hydrogen chemistry.

29. **R. L. Mills, A. Voigt, B. Dhandapani, J. He, "Synthesis and Characterization of Lithium Chloro Hydride", Int. J. Hydrogen Energy, submitted.**

A novel inorganic hydride compound lithium chloro hydride, $LiHCl$, which comprises a high binding energy hydride ion was synthesized by reaction of atomic hydrogen with potassium metal and lithium chloride. Lithium chloro hydride was identified by time of flight secondary ion mass spectroscopy, X-ray photoelectron spectroscopy (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA), ^1H nuclear magnetic resonance spectroscopy (Spectral Data Services, Inc., Champaign, IL), and powder X-ray diffraction (IC Laboratories, Amawalk, NY). Hydride ions with increased binding energies may form many novel compounds with broad applications such as the oxidant of a high voltage battery.

28. **R. Mills, E. Dayalan, P. Ray, B. Dhandapani, J. He, "Highly Stable Novel Inorganic Hydrides from Aqueous Electrolysis and Plasma Electrolysis", Electrochimica Acta, Vol. 47, No. 24, (2002), pp. 3909-3926.**

After 10^4 hours of continuous aqueous electrolysis with K_2CO_3 as the electrolyte, highly stable novel inorganic hydride compounds such as $KH\,KHCO_3$ and KH were isolated and identified by time of flight secondary ion mass spectroscopy (ToF-SIMS) (Charles Evans East, East Windsor, NJ). The existence of novel hydride ions was determined using X-ray photoelectron spectroscopy (XPS) (Zettlemoyer Center for

Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA) and solid state magic-angle spinning ^1H nuclear magnetic resonance spectroscopy (^1H MAS NMR) (Spectral Data Services, Inc., Champaign, IL). A novel ion formed by plasma electrolysis of a K_2CO_3, Rb_2CO_3, or Cs_2CO_3 electrolyte was also observed by high resolution visible spectroscopy at 407.0 nm corresponding to its predicted binding energy of $3.05\ eV$.

27. **R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy", Int. J. Hydrogen Energy, Vol. 26, No. 9, Sept. (2001), pp. 965-979.**

Novel inorganic alkali and alkaline earth hydrides of the formula MH^*, MH_2^*, and MH^*X wherein M is the metal, X, is a halide, and H^* comprises a novel high binding energy hydride ion were synthesized in a high temperature gas cell by reaction of atomic hydrogen with a catalyst and MH, MH_2, or MX corresponding to an alkali metal or alkaline earth metal compound, respectively. Novel hydride ions of the corresponding novel hydride compounds were characterized by an extraordinary upfield shifted peak observed by ^1H nuclear magnetic resonance spectroscopy. The result were confirmed on five different instruments at five independent laboratories (Spectral Data Services, Inc., Champaign, IL, National Research Council of Canada, University of Massachusetts Amherst, Amherst, MA, University of Delaware, Wilmington, DE, and Grace Davison, Columbia, MD).

26. **R. Mills, B. Dhandapani, N. Greenig, J. He, "Synthesis and Characterization of Potassium Iodo Hydride", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1185-1203.**

A novel inorganic hydride compound KHI which comprises a high binding energy hydride ion was synthesized by reaction of atomic hydrogen with potassium metal and potassium iodide. Potassium iodo hydride was identified by time of flight secondary ion mass spectroscopy, X-ray photoelectron spectroscopy (Zettlemoyer

Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA), ^{1}H and ^{39}K nuclear magnetic resonance spectroscopy (Spectral Data Services, Inc., Champaign, IL), Fourier transform infrared spectroscopy (Surface Science Laboratories, Mountain View, CA), electrospray ionization time of flight mass spectroscopy (Perkin-Elmer Biosystems, Framingham, MA), liquid chromatography/mass spectroscopy (Ricerca, Inc., Painesville, Ohio), thermal decomposition with analysis by gas chromatography, and mass spectroscopy, and elemental analysis (Galbraith Laboratories, Inc., Knoxville, TN). Hydride ions with increased binding energies may form many novel compounds with broad applications.

25. **R. Mills, "Novel Inorganic Hydride", Int. J. of Hydrogen Energy, Vol. 25, (2000), pp. 669-683.**

A novel inorganic hydride compound $KHKHCO_3$ which is stable in water and comprises a high binding energy hydride ion was isolated following the electrolysis of a K_2CO_3 electrolyte. Inorganic hydride clusters $K[KHKHCO_3]_n^+$ were identified by Time of Flight Secondary Ion Mass Spectroscopy (Charles Evans East, East Windsor, NJ). Moreover, the existence of a novel hydride ion has been determined using X-ray photoelectron spectroscopy (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA), and ^{1}H nuclear magnetic resonance spectroscopy (Spectral Data Services, Inc., Champaign, IL). Hydride ions with increased binding energies may be the basis of a high voltage battery for electric vehicles.

24. **R. Mills, B. Dhandapani, M. Nansteel, J. He, T. Shannon, A. Echezuria, "Synthesis and Characterization of Novel Hydride Compounds", Int. J. of Hydrogen Energy, Vol. 26, No. 4, (2001), pp. 339-367.**

Novel inorganic alkali and alkaline earth hydrides of the formula MHX and $MHMX$ wherein M is the metal, X, is a singly negatively charged anion, and H comprises a novel high binding energy hydride ion were synthesized in a high temperature gas cell by reaction of atomic hydrogen with a catalyst and MX or MX_2

corresponding to an alkali metal or alkaline earth metal, respectively. It has been reported that intense extreme ultraviolet (EUV) emission was observed at low temperatures (e.g. $\approx 10^3\ K$) from atomic hydrogen and certain atomized elements or certain gaseous ions which ionize at integer multiples of the potential energy of atomic hydrogen, $27.2\ eV$ [1-5]. These atomized elements or certain gaseous ions comprised the catalyst to form MHX and $MHMX$. For example, atomic hydrogen was reacted with strontium vapor and $SrBr_2$ to form $SrHBr$. Novel hydride compounds such as $SrHBr$ were identified by time of flight secondary ion mass spectroscopy, X-ray photoelectron spectroscopy (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA), ^1H nuclear magnetic resonance spectroscopy (Spectral Data Services, Inc., Champaign, IL), and thermal decomposition with analysis by gas chromatography, and mass spectroscopy. Hydride ions with increased binding energies form novel compounds with potential broad applications such as a high voltage battery for consumer electronics and electric vehicles. In addition, these novel compositions of matter and associated technologies may have far-reaching applications in many industries including chemical, electronics, computer, military, energy, and aerospace in the form of products such as propellants, solid fuels, surface coatings, structural materials, and chemical processes.

23. **R. Mills, "Highly Stable Novel Inorganic Hydrides", Journal of New Materials for Electrochemical Systems, Vol. 6, (2003), pp. 45-54.**

Novel inorganic hydride compounds $KH\,KHCO_3$ and KH were isolated following the electrolysis of a K_2CO_3 electrolyte. The compounds which comprised high binding energy hydride ions were stable in water, and KH was stable at elevated temperature (600 °C). Inorganic hydride clusters $K[KH\,KHCO_3]_n^+$ were identified by positive Time of Flight Secondary Ion Mass Spectroscopy (ToF-SIMS) of $KH\,KHCO_3$ (Charles Evans East, East Windsor, NJ). The negative ToF-SIMS was dominated by hydride ion. The positive and negative ToF-SIMS of KH showed essentially K^+ and H^- only, respectively. Moreover, the existence of novel hydride ions was determined using X-ray photoelectron spectroscopy (Zettlemoyer Center for Surface Studies, Sinclair

Laboratory, Lehigh University, Bethlehem, PA), and ^1H nuclear magnetic resonance spectroscopy (Spectral Data Services, Inc., Champaign, IL). Hydride ions with increased binding energies may be the basis of a high voltage battery for electric vehicles.

22. **R. Mills, "Novel Hydrogen Compounds from a Potassium Carbonate Electrolytic Cell", Fusion Technology, Vol. 37, No. 2, March, (2000), pp. 157-182.**

Novel compounds containing hydrogen in new hydride and polymeric states which demonstrate novel hydrogen chemistry have been isolated following the electrolysis of a K_2CO_3 electrolyte with the production of excess energy. Inorganic hydride clusters $K[KH\,KHCO_3]_n^+$ and hydrogen polymer ions such as OH_{23}^+ and H_{16}^- were identified by time of flight secondary ion mass spectroscopy (Charles Evans East, East Windsor, NJ). The presence of compounds containing new states of hydrogen were confirmed by X-ray photoelectron spectroscopy (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA), X-ray diffraction, Fourier transform infrared spectroscopy (Surface Science Laboratories, Mountain View, CA), Raman spectroscopy (Environmental Catalysis and Materials Laboratory of Virginia Polytechnic Institute), and ^1H nuclear magnetic resonance spectroscopy (Spectral Data Services, Inc., Champaign, IL).

21. **Mills, R., Good, W., "Fractional Quantum Energy Levels of Hydrogen", Fusion Technology, Vol. 28, No. 4, November, (1995), pp. 1697-1719.**

Determination of excess heat release during the electrolysis of aqueous potassium carbonate by the very accurate and reliable method of heat measurement, flow calorimetry; describes the experimental identification of hydrogen atoms in fractional quantum energy levels—hydrinos—by X-ray Photoelectron Spectroscopy (XPS) (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA); describes the experimental identification of hydrogen atoms in fractional quantum energy levels—hydrinos—by emissions of soft X-rays from dark

matter; describes the experimental identification of hydrogen molecules in fractional quantum energy levels—dihydrino molecules by high resolution magnetic sector mass spectroscopy with ionization energy determination, and gives a summary.

In summary:

Excess power and heat were observed during the electrolysis of aqueous potassium carbonate. Flow calorimetry of pulsed current electrolysis of aqueous potassium carbonate at a nickel cathode was performed in a single-cell dewar. The average power out of 24.6 watts exceeded the average input power (voltage times current) of 4.73 watts by a factor greater than 5. The total input energy (integration of voltage times current) over the entire duration of the experiment was 5.72 MJ; whereas, the total output energy was 29.8 MJ. No excess heat was observed when the electrolyte was changed from potassium carbonate to sodium carbonate. The source of heat is assigned to the electrocatalytic, exothermic reaction whereby the electrons of hydrogen atoms are induced to undergo transitions to quantized energy levels below the conventional "ground state". These lower energy states correspond to fractional quantum numbers: n = 1/2, 1/3, 1/4, ... Transitions to these lower energy states are stimulated in the presence of pairs of potassium ions (K^+/K^+ electrocatalytic couple) which provide 27.2 eV energy sinks.

The identification of the n = 1/2 hydrogen atom , H(n = 1/2) is reported. Samples of the nickel cathodes of aqueous potassium carbonate electrolytic cells and aqueous sodium carbonate electrolytic cells were analyzed by XPS (Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA). A broad peak centered at 54.6 eV was present only in the cases of the potassium carbonate cells. The binding energy (in vacuum) of H(n = 1/2) is 54.4 eV. Thus, the theoretical and measured binding energies for H(n = 1/2) are in excellent agreement.

Further experimental identification of hydrinos—down to H(n = 1/8)—can be found in the alternative explanation by Mills et al. for the soft X-ray emissions of the dark interstellar medium observed by Labov and Bowyer [Labov, S., Bowyer, S., "Spectral observations of the extreme ultraviolet background", The Astrophysical Journal, 371, (1991), pp. 810-819] of the Extreme UV Center of the University of California, Berkeley.

The agreement between the experimental spectrum and the energy values predicted for the proposed transitions is remarkable.

The reaction product of two H(n=1/2) atoms, the dihydrino molecule, was identified by mass spectroscopy (Shrader Analytical & Consulting Laboratories). The mass spectrum of the cryofiltered gases evolved during the electrolysis of a light water K_2CO_3 electrolyte with a nickel cathode demonstrated that the dihydrino molecule, $H_2\left(n=\frac{1}{2}\right)$, has a higher ionization energy, about 63 eV, than normal molecular hydrogen, $H_2(n=1)$, 15.46 eV. The high resolution (0.001 AMU) magnetic sector mass spectroscopic analysis of the postcombustion gases indicated the presence of two peaks of nominal mass two-- one peak at 70 eV and one peak at 25 eV. The same analysis of molecular hydrogen indicates only one peak at 25 eV and one peak at 70 eV. In the case of the postcombustion sample at 70 eV, one peak was assigned as the hydrogen molecular ion peak, $H_2^+(n=1)$, and one peak was assigned as the dihydrino molecular peak, $H_2^+\left(n=\frac{1}{2}\right)$ which has a slightly larger magnetic moment.

20. **Mills, R., Good, W., Shaubach, R., "Dihydrino Molecule Identification", Fusion Technology, Vol. 25, 103 (1994).**

Calorimetry of pulsed current and continuous electrolysis of aqueous potassium carbonate (K^+/K^+ electrocatalytic couple) at a nickel cathode was performed by Thermacore, Inc., Lancaster, PA. The excess power out of 41 watts exceeded the total input power given by the product of the electrolysis voltage and current by a factor greater than 8. Elemental analysis of the electrolyte and metallurgical analysis of the cathode showed no evidence of chemical reactions. The pH, specific gravity, concentration of K_2CO_3, and the elemental analysis of the electrolyte sample taken after 42 days of continuous operation were unchanged from that of the values obtained for the electrolyte sample taken before operation. Elemental analysis and scanning electron microscopy of metallurgical samples of the nickel cathode taken before operation and at day 56 of continuous operation were identical indicating that the nickel cathode had not changed chemically or physically. Scintillation counter and

photographic film measurements showed that no radiation above background was detected indicating that nuclear reactions did not occur.

The "ash" of the exothermic reaction is atoms having electrons of energy below the "ground state" which are predicted to form molecules. The predicted molecules were identified by lack of reactivity with oxygen, by separation from molecular deuterium by cryofiltration, and by mass spectroscopic analysis. The combustion of the gases evolved during the electrolysis of a light water K_2CO_3 electrolyte (K^+/K^+ electrocatalytic couple) with a nickel cathode was incomplete. The mass spectroscopic analysis (Dr. David Parees of Air Products & Chemicals, Inc.) of the m/e = 2 peak of the combusted gas demonstrated that the dihydrino molecule, $H_2(n = 1/2)$, has a higher ionization energy than H_2.

Calorimetry of pulsed current and continuous electrolysis of aqueous potassium carbonate (K^+/K^+ electrocatalytic couple) at a nickel cathode was performed in single cell dewar calorimetry cells by HydroCatalysis Power Corporation. Excess power out exceeded input power by a factor greater than 16. No excess heat was observed when the electrolyte was changed from potassium carbonate to the control sodium carbonate. The faraday efficiency was measured volumetrically to be 100%.

19. **V. Noninski, Fusion Technol., Vol. 21, 163 (1992).**

Dr. Noninski of the Laboratory for Electrochemistry of Renewed Electrode-Solution Interface (LEPGER) successfully reproduced the results of Mills and Kneizys [R. Mills and S. Kneizys, Fusion Technol. Vol. 20, 65 (1991)] as a visiting professor at Franklin and Marshall College. A significant increase in temperature with every watt input, compared with the calibration experiment ($\approx 50\ ^\circ C / W$ versus $\approx 30\ ^\circ C / W$), was observed during the electrolysis of potassium carbonate. This effect was not observed when sodium carbonate was electrolyzed. No trivial explanation (in terms of chemical reactions, change in heat transfer properties, etc.) of this effect were found.

18. **Niedra, J., Meyers, I., Fralick, G. C., and Baldwin, R., "Replication of the Apparent Excess Heat Effect in a Light Water-Potassium Carbonate-Nickel**

Electrolytic Cell, NASA Technical Memorandum 107167, February, (1996). pp. 1-20.; Niedra, J., Baldwin, R., Meyers, I., NASA Presentation of Light Water Electrolytic Tests, May 15, 1994.

NASA Lewis tested a cell identical to that of Thermacore [Mills, R., Good, W., Shaubach, R., "Dihydrino Molecule Identification", Fusion Technology, Vol. 25, 103 (1994)] with the exception that it was minus the central cathode. A cell identical to the test cell with heater power only (no electrolysis) was the calibration control and the blank cell with the heater power equal to zero. The test cell was also calibrated "on the fly" by measuring the temperature relative to the blank cell at several values of heater input power of the test cell. "Replication of experiments claiming to demonstrate excess heat production in light water-Ni-K_2CO_3 electrolytic cells was found to produce an apparent excess heat of 11 W maximum, for 60 W electrical power into the cell. Power gains ranged from 1.06 to 1.68." The production of excess energy with a power gain of 1.68 would require 0% Faraday efficiency to account for the observed excess power.

17. **Technology Insights, 6540 Lusk Boulevard, Suite C-102, San Diego, CA 92121, "HydroCatalysis Technical Assessment Prepared for PacifiCorp", August 2, 1996.**

This report documents a technical assessment of a novel source of hydrogen energy advanced by HydroCatalysis Power Corporation now BlackLight Power, Inc. (BLP). The assessment was conducted as part of the due diligence performed for PacifiCorp. It was conducted by a literature search and review, site visits to BLP and collaborating organizations, and telephone interviews with others active in the general area. A description of concept is provided in Section 3. Section 4 presents an assessment of the concept background, supporting theory, laboratory prototypes, projected initial products, and economic and environmental aspects. Section 5 documents the results of telephone interviews and site visits. An overall summary and conclusions are presented in the following section.

16. **P. M. Jansson, "HydroCatalysis: A New Energy Paradigm for the 21st Century", Thesis Submitted in partial fulfillment of the requirements of the**

Masters of Science in Engineering Degree in the Graduate Division of Rowan University, May 1997, Thesis Advisors: Dr. J. L. Schmalzel, Dr. T. R. Chandrupatla, and Dr. A. J. Marchese, External Advisors: Dr. J. Phillips, Pennsylvania State University, Dr. R. L. Mills, BlackLight Power, Inc., W. R. Good, BlackLight Power, Inc.

This thesis reviews the problems of worldwide energy supply, describes the current technologies that meet the energy needs of our industrial societies, summarizes the environmental impacts of those fuels and technologies and their increased use by a growing global and increasing technical economy. The work also describes and advances the technology being developed by BlackLight Power, Inc. (BLP) a scientific company located in Princeton, New Jersey. BLP's technology purports to offer commercially viable and useful heat generation via a previously unrecognized natural phenomenon - the catalytic reduction of the hydrogen atom to a lower energy state. Laboratory tests obtained as original research of this thesis as well as the review of the data of others substantiate the fact that replication of the experimental conditions which are favorable to initiating and sustaining the new energy release process will generate controllable, reproducible, sustainable and commercial meaningful heat. For example, Jansson has determined heat production associated with hydrino formation with a Calvet calorimeter which yielded exceptional results. Specifically, the results are completely consistent with Mills hydrino formation hypothesis. Approximately 10^{-3} moles of hydrogen was admitted to a 20 cm^3 Calvet cell containing a heated platinum filament and KNO_3 powder. In the three separate trials with a platinum filament hydrogen dissociator which was varied in length of 10 cm, 20 cm, and 30 cm, a mean power of 0.581, 0.818, and 1.572 watts was observed, respectively. The closed experiments were run to completion. The energy observed was 622, 369, and 747 kJ, respectively, This is equivalent to the generation of $6.2\,X\,10^8\ J/mole$, $3.7\,X\,10^8\ J/mole$, and $7.5\,X\,10^8\ J/mole$ of hydrogen, respectively, as compared to $2.5\,X\,10^5\ J/mole$ of hydrogen anticipated for standard hydrogen combustion. Thus, the total heats generated appear to be at least 1000 times too large to be explained by conventional chemistry, but the results are completely consistent with Mills model. Convincing

evidence is presented to lead to the conclusion that BLP technology has tremendous potential to achieve commercialization and become an energy paradigm for the next century. The research was also conducted as part of the due diligence performed for Atlantic Energy now Connectiv.

15. **Phillips, J., Smith, J., Kurtz, S., "Report On Calorimetric Investigations Of Gas-Phase Catalyzed Hydrino Formation" Final report for Period October-December 1996", January 1, 1997, A Confidential Report submitted to BlackLight Power, Inc. provided by BlackLight Power, Inc., Great Valley Corporate Center, 41 Great Valley Parkway, Malvern, PA 19355.**

Pennsylvania State University Chemical Engineering Department has determined heat production associated with hydrino formation with a Calvet calorimeter which yielded exceptional results. Specifically, the results are completely consistent with Mills hydrino formation hypothesis. In three separate trials, between 10 and 20 K Joules were generated at a rate of 0.5 Watts, upon admission of approximately 10^{-3} moles of hydrogen to the 20 cm^3 Calvet cell containing a heated platinum filament and KNO_3 powder. This is equivalent to the generation of $10^7\ J/mole$ of hydrogen, as compared to $2.5\,X\,10^5\ J/mole$ of hydrogen anticipated for standard hydrogen combustion. Thus, the total heats generated appear to be 100 times too large to be explained by conventional chemistry, but the results are completely consistent with Mills model.

14. **Phillips, J., Shim, H., "Additional Calorimetric Examples of Anomalous Heat from Physical Mixtures of K/Carbon and Pd/Carbon", January 1, 1996, A Confidential Report submitted to HydroCatalysis Power Corporation provided by HydroCatalysis Power Corporation, Great Valley Corporate Center, 41 Great Valley Parkway, Malvern, PA 19355.**

Pennsylvania State University Chemical Engineering Department has determined excess heat release from flowing hydrogen in the presence of ionic hydrogen spillover catalytic material: 40% by weight potassium nitrate (KNO_3) on graphitic carbon powder with 5% by weight 1%-Pd-on-graphitic carbon (K^+/K^+ electrocatalytic couple) by the very

accurate and reliable method of heat measurement, thermopile conversion of heat into an electrical output signal. Excess power and heat were observed with flowing hydrogen over the catalyst. However, no excess power was observed with flowing helium over the catalyst mixture. Rates of heat production were reproducibly observed which were higher than that expected from the conversion of all the hydrogen entering the cell to water, and the total energy observed was over four times larger than that expected if all the catalytic material in the cell were converted to the lowest energy state by "known" chemical reactions. Thus, "anomalous" heat, heat of a magnitude and duration which could not be explained by conventional chemistry, was reproducibly observed.

13. **Bradford, M. C., Phillips, J., "A Calorimetric Investigation of the Reaction of Hydrogen with Sample PSU #1", September 11, 1994, A Confidential Report submitted to HydroCatalysis Power Corporation provided by HydroCatalysis Power Corporation, Great Valley Corporate Center, 41 Great Valley Parkway, Malvern, PA 19355.**

Pennsylvania State University Chemical Engineering Department has determined excess heat release from flowing hydrogen in the presence of nickel oxide powder containing strontium niobium oxide (Nb^{3+}/Sr^{2+} electrocatalytic couple) by the very accurate and reliable method of heat measurement, thermopile conversion of heat into an electrical output signal. Excess power and heat were observed with flowing hydrogen over the catalyst which increased with increasing flow rate. However, no excess power was observed with flowing helium over the catalyst/nickel oxide mixture or flowing hydrogen over nickel oxide alone. Approximately 10 cc of nickel oxide powder containing strontium niobium oxide immediately produced 0.55 W of steady state output power at 523 K. When the gas was switched from hydrogen to helium, the power immediately dropped. The switch back to hydrogen restored the excess power output which continued to increase until the hydrogen source cylinder emptied at about the 40,000 second time point. With no hydrogen flow the output power fell to zero.

The source of heat is assigned to the electrocatalytic, exothermic reaction whereby the electrons of hydrogen atoms are induced to undergo transitions to

quantized energy levels below the conventional "ground state". These lower energy states correspond to fractional quantum numbers: n = 1/2, 1/3, 1/4, ... Transitions to these lower energy states are stimulated in the presence of pairs of niobium and strontium ions (Nb^{3+}/Sr^{2+} electrocatalytic couple) which provide 27.2 eV energy sinks.

12. **Jacox, M. G., Watts, K. D., "The Search for Excess Heat in the Mills Electrolytic Cell", Idaho National Engineering Laboratory, EG&G Idaho, Inc., Idaho Falls, Idaho, 83415, January 7, 1993.**

Idaho National Engineering Laboratory (INEL) operated a cell identical to that of Thermacore [Mills, R., Good, W., Shaubach, R., "Dihydrino Molecule Identification", Fusion Technology, Vol. 25, 103 (1994)] except that it was minus the central cathode and that the cell was wrapped in a one-inch layer of urethane foam insulation about the cylindrical surface. The cell was operated in a pulsed power mode. A current of 10 amperes was passed through the cell for 0.2 seconds followed by 0.8 seconds of zero current for the current cycle. The cell voltage was about 2.4 volts, for an average input power of 4.8 W. The electrolysis power average was 1.84 W, and the stirrer power was measured to be 0.3 W. Thus, the total average net input power was 2.14 W. The cell was operated at various resistance heater settings, and the temperature difference between the cell and the ambient as well as the heater power were measured. The results of the excess power as a function of cell temperature with the cell operating in the pulsed power mode at 1 Hz with a cell voltage of 2.4 volts, a peak current of 10 amperes, and a duty cycle of 20 % showed that the excess power is temperature dependent for pulsed power operation, and the maximum excess power was 18 W for an input electrolysis joule heating power of 2.14 W. Thus, the ratio of excess power to input electrolysis joule heating power was 850 %. INEL scientists constructed an electrolytic cell comprising a nickel cathode, a platinized titanium anode, and a 0.57 M K_2CO_3 electrolyte. The cell design appears in Appendix 1. The cell was operated in the environmental chamber in the INEL Battery Test Laboratory at constant current, and the heat was removed by forced air convection in two cases. In the first case, the air was circulated by the environmental chamber circulatory system alone. In the second case,

an additional forced air fan was directed onto the cell. The cell was equipped with a water condenser, and the water addition to the cell due to electrolysis losses was measured. The data of the forced convection heat loss calorimetry experiments during the electrolysis of a 0.57 M K_2CO_3 electrolyte with the INEL cell showed that 13 W of excess power was produced. This excess power could not be attributed to recombination of the hydrogen and oxygen as indicated by the equivalence of the calculated and measured water balance.

11. **Peterson, S., H., Evaluation of Heat Production from Light Water Electrolysis Cells of HydroCatalysis Power Corporation, Report from Westinghouse STC, 1310 Beulah Road, Pittsburgh, PA, February 25, 1994.**

Westinghouse Electric Corporation reports that excess heat was observed during the electrolysis of aqueous potassium carbonate (K^+/K^+ electrocatalytic couple) where the electrolysis of aqueous sodium carbonate served as the control. The data of the temperature of the cell minus the ambient temperature shows that when potassium carbonate replaced sodium carbonate in the same cell with the same input electrolysis power, the potassium experiment was twice as hot as the sodium carbonate experiment for the duration of the experiment, one month. The net faraday efficiency of gas evolution was experimentally measured to be unity by weighing the experiment to determine that the expected rate of water consumption was observed. The output power exceeded the total input power. The data was analyzed by HydroCatalysis Power Corporation [Mills, R., Analysis by HydroCatalysis Power Corporation of Westinghouse Report Entitled "Evaluation of Heat Production from Light Water Electrolysis Cells of HydroCatalysis Power Corporation, Report from Westinghouse STC", February 25, 1994].

10. **Haldeman, C. W., Savoye, G. W., Iseler, G. W., Clark, H. R., MIT Lincoln Laboratories Excess Energy Cell Final report ACC Project 174 (3), April 25, 1995.**

During the electrolysis of aqueous potassium carbonate, researchers working at MIT Lincoln Laboratories observed long duration excess power of 1-5 watts with output/input ratios over 10 in some cases with respect to the cell input power reduced by the enthalpy of the generated gas. In these cases, the output was 1.5 to 4 times the integrated volt-ampere power input. Faraday efficiency was measured volumetrically by direct water displacement.

9. **Craw-Ivanco, M. T.; Tremblay, R. P.; Boniface, H. A.; Hilborn, J. W.; "Calorimetry for a Ni/K_2CO_3 Cell", Atomic Energy Canada Limited, Chemical Engineering Branch, Chalk River Laboratories, Chalk River, Ontario, June 1994.**

Atomic Energy Canada Limited, Chalk River Laboratories, report that 128 % and 138% excess heat were observed in separate experiments by flow calorimetry during the electrolysis of aqueous potassium carbonate (K+/K+ electrocatalytic couple) in a closed cell, and that 138% was observed in an open cell.

8. **Shaubach, R. M., Gernert, N. J., "Anomalous Heat From Hydrogen in Contact with Potassium Carbonate", Thermacore Report, March 1994.**

A high temperature/high pressure/high power density industrial prototype gas cell power generator which produced 50 watts of power at 300 °C having a nickel surface area of only 300 cm^2 was successfully developed. A sample of the nickel tubing of the aqueous potassium carbonate permeation cell was analyzed by XPS at the Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA. A broad peak centered at 54.6 eV was present; whereas, the control nickel tube showed no feature. The binding energy (in vacuum) of H(n = 1/2) is 54.4 eV. Thus, the theoretical and measured binding energies for H(n = 1/2) are in excellent agreement. No excess energy or 54.6 eV feature were observed when sodium carbonate replaced potassium carbonate.

7. **Gernert, N., Shaubach, R. M., Mills, R., Good, W., "Nascent Hydrogen: An Energy Source," Final Report prepared by Thermacore, Inc., for the Aero Propulsion and Power Directorate, Wright Laboratory, Air Force Material Command (ASC), Wright-Patterson Air Force Base, Contract Number F33615-93-C-2326, May, (1994).**

In a report prepared for the Aero Propulsion and Power Directorate, Wright Laboratory, Air Force Material Command (ASC), Wright-Patterson Air Force Base, Thermacore reports, "anomalous heat was observed from a reaction of atomic hydrogen in contact with potassium carbonate on a nickel surface. The nickel surface consisted of 500 feet of 0.0625 inch diameter tubing wrapped in a coil. The coil was inserted into a pressure vessel containing a light water solution of potassium carbonate. The tubing and solution were heated to a steady state temperature of 249 °C using an I^2R heater. Hydrogen at 1100 psig was applied to the inside of the tubing. After the application of hydrogen, a 32 °C increase in temperature of the cell was measured which corresponds to 25 watts of heat. Heat production under these conditions is predicted by the theory of Mills where a new species of hydrogen is produced that has a lower energy state than normal hydrogen. ESCA analysis, done independently by Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA, have found the predicted 55 eV signature of this new species of hydrogen."

6. **Wiesmann, H., Brookhaven National Laboratory, Department of Applied Science, Letter to Dr. Walter Polansky of the Department of Energy Regarding Excess Energy Verification at Brookhaven National Laboratory, October 16, 1991.**

Calorimetry of continuous electrolysis of aqueous potassium carbonate (K^+/K^+ electrocatalytic couple) at a nickel cathode was performed in single cell dewar calorimetry cell by Noninski at Brookhaven National Laboratory. Dr. Weismann observed the experiment and reported the results to Dr. Walter Polansky of the U. S. Department of Energy. Dr. Weismann reports, "The claim is as follows. The temperature rise in the dewar is greater in the case of electrolysis as compared to using

a resistor, even though the power dissipated is equal in both cases. According to Dr. Mills' theory, this apparent "excess power" is due to the fact that the electron in a hydrogen atom can "decay" to stable subinteger quantum levels. Dr. Noninski demonstrated this thermal effect at BNL." The observed rise in temperature for a given input power was twice as high comparing electrolysis versus heater power.

5. **Nesterov, S. B., Kryukov, A. P., Moscow Power Engineering Institute Affidavit, February, 26,1993.**

The Moscow Power Engineering Institute experiments showed 0.75 watts of heat output with only 0.3 watts of total power input (power = VI) during the electrolysis of an aqueous potassium carbonate electrolyte with a nickel foil cathode and a platinized titanium anode. Excess power over the total input on the order of 0.45 watts was produced reliably and continuously over a period of three months. Evaluation of the electrolyte after three months of operation showed no significant change in its density or molar concentration. The cell was disassembled and inspected after over one month of operation at 0.1 amperes. This inspection showed no visible signs of a reaction between the electrodes and the electrolyte. The cell was re-assembled and operated as before. Excess energy was produced for the three month duration of the experiment. Scintillation counter measurements showed no signs of radiation external to the cell.

4. **Miller, A., Simmons, G., Lehigh X-Ray Photoelectron Spectroscopy Report, Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University Bethlehem, PA, November 1993.**

Samples of the nickel cathodes of aqueous potassium carbonate electrolytic cells and aqueous sodium carbonate electrolytic cells were analyzed by XPS by Miller and Simmons of the Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA. A broad peak centered at 54.6 eV was present only in the cases of the potassium carbonate cells. The binding energy (in vacuum) of H(n = 1/2) is 54.4 eV. Thus, the theoretical and measured binding energies for H(n = 1/2) are in excellent agreement. Lehigh University has conducted an extensive investigation of the cathodes from heat producing as well as those from control cells. Miller concludes that

"I was unable to find any other elements on the surface that cause the feature. The persistent appearance of a spectral feature near the predicted binding energy for many of the electrodes used with a K electrolyte is an encouraging piece of evidence for the existence of the reduced energy state hydrogen".

3. **Jacox, M. G., Watts, K. D., "INEL XPS Report", Idaho National Engineering Laboratory, EG&G Idaho, Inc., Idaho Falls, Idaho, 83415, November 1993.**

The Lehigh XPS results of a broad peak centered at 54.6 eV present only in the cases of the potassium carbonate cells [Miller, A., Simmons, G., Lehigh X-Ray Photoelectron Spectroscopy Report, Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA, November 1993] were confirmed at Idaho National Engineering Laboratory (INEL). Samples which demonstrated the feature as well as control electrodes were tested for the presence of trace amounts of impurities of the elements iron and lithium at a sensitivity level of greater than 1000 times that of XPS. TOF-SIMS (Time of Flight-Secondary Ion Mass Spectroscopy) and XPS analysis of the nickel surface was performed by Charles Evans & Associates, Sunnyvale, CA [Lee, Jang-Jung, Charles Evans & Associates Time-Of-Flight Secondary Ion Mass Spectroscopy (TOF-SIMS) Surface Analysis Report, CE&A Number 40150, March 18, 1994]. The 54.6 eV feature was also observed by Charles Evans & Associates in the case of cathodes of potassium carbonate electrolytic cells [Craig, A., Y., Charles Evans & Associates XPS/ESCA Results, CE&A Number 44545, November 3, 1994]. Iron and lithium were the only remaining atoms which were in question by Lehigh University and INEL as the source of the 54.6 eV XPS peak. The Charles Evans TOF-SIMS results demonstrate that iron and lithium were not the source of this peak.

2. **Lee, Jang-Jung, Charles Evans & Associates Time-Of-Flight Secondary Ion Mass Spectroscopy (TOF-SIMS) Surface Analysis Report, CE&A Number 40150, March 18, 1994.**

The Lehigh XPS results of a broad peak centered at 54.6 eV present only in the cases of the potassium carbonate cells [Miller, A., Simmons, G., Lehigh X-Ray Photoelectron Spectroscopy Report, Zettlemoyer Center for Surface Studies, Sinclair

Laboratory, Lehigh University, Bethlehem, PA, November 1993] were confirmed at Idaho National Engineering Laboratory (INEL) [Jacox, M. G., Watts, K. D., "INEL XPS Report", Idaho National Engineering Laboratory, EG&G Idaho, Inc., Idaho Falls, Idaho, 83415, November 1993]. Samples which demonstrated the feature as well as control electrodes were tested for the presence of trace amounts of impurities of the elements iron and lithium at a sensitivity level of greater than 1000 times that of XPS. TOF-SIMS (Time of Flight-Secondary Ion Mass Spectroscopy) and XPS analysis of the nickel surface was performed by Charles Evans & Associates, Sunnyvale, CA. The 54.6 eV feature was also observed by Charles Evans & Associates in the case of cathodes of potassium carbonate electrolytic cells [Jacox, M. G., Watts, K. D., "INEL XPS Report", Idaho National Engineering Laboratory, EG&G Idaho, Inc., Idaho Falls, Idaho, 83415, November 1993]. Iron and lithium were the only remaining atoms which were in question by Lehigh University and INEL as the source of the 54.6 eV XPS peak. The Charles Evans TOF-SIMS results demonstrate that iron and lithium were not the source of this peak.

1. **Craig, A., Y., Charles Evans & Associates XPS/ESCA Results, CE&A Number 44545, November 3, 1994.**

The Lehigh XPS results of a broad peak centered at 54.6 eV present only in the cases of the potassium carbonate cells [Miller, A., Simmons, G., Lehigh X-Ray Photoelectron Spectroscopy Report, Zettlemoyer Center for Surface Studies, Sinclair Laboratory, Lehigh University, Bethlehem, PA, November 1993] were confirmed at Idaho National Engineering Laboratory (INEL) [Jacox, M. G., Watts, K. D., "INEL XPS Rèport", Idaho National Engineering Laboratory, EG&G Idaho, Inc., Idaho Falls, Idaho, 83415, November 1993]. Samples which demonstrated the feature as well as control electrodes were tested for the presence of trace amounts of impurities of the elements iron and lithium at a sensitivity level of greater than 1000 times that of XPS. TOF-SIMS (Time of Flight-Secondary Ion Mass Spectroscopy) and XPS analysis of the nickel surface was performed by Charles Evans & Associates, Sunnyvale, CA [Lee, Jang-Jung, Charles Evans & Associates Time-Of-Flight Secondary Ion Mass Spectroscopy (TOF-SIMS) Surface Analysis Report, CE&A Number 40150, March 18, 1994]. The 54.6 eV feature was also observed by Charles Evans & Associates in the case of

cathodes of potassium carbonate electrolytic cells. Iron and lithium were the only remaining atoms which were in question by Lehigh University and INEL as the source of the 54.6 eV XPS peak. The Charles Evans TOF-SIMS results demonstrate that iron and lithium were not the source of this peak.

Given Applicant's full compliance with the new standards imposed by Specialist McGinty during the February 11, 2003 Interview, which required independent validation of the experimental evidence of record, Applicant is entitled to have this evidence accepted as reliable and to have this and other BlackLight applications issue as patents.

Examiner Langel's Reaffirmation of the Utility and Operability of Applicant's Novel Hydrogen Technology and His Subsequent Resignation From Examining BlackLight Cases "For Moral and Ethical Reasons"

Pursuant to the representations and agreements made during the February 11, 2003 Interview (reprinted below), Applicant followed up by submitting much of the independently generated scientific evidence cited above in two pending BlackLight applications and arranging an Interview with Examiner Langel, who was assigned to those cases and supposedly had full authority to issue them. [U.S. Serial Nos. 09/110,678 ('678 application) and 09/362,693 ('693 application).] The express purpose of the Interview, held on April 14, 2003, was to review those two applications on a claim-by-claim basis to ensure that the scientific data presented adequately supported the scope of the claims. Examiner Langel expressed once again his view that the claims of the two applications were adequately supported by the data and, therefore, those claims were allowable.

A detailed account of the discussions Applicant's counsel, Jeffrey Melcher and Jeffrey Simenauer, had with Examiner Langel during the April 14, 2003 Interview, and with Examiner Langel and his supervisor, SPE Stanley Silverman, during follow-up telephone Interviews were documented in Supplemental Responses filed in the '678 and '693 applications, comments from which are reproduced below. Based on the shocking revelations divulged during these discussions, Applicant must once again protest in the strongest terms possible the manner in which an anonymous group of

PTO officials (*i.e.*, the "Secret Committee") has mishandled the examination of BlackLight's patent applications relating to Applicant's novel hydrogen technology.

Counsel was particularly distressed to learn that when Examiner Langel met with Supervisor Silverman to advocate allowing the '678 and '693 applications to issue as patents, his supervisor informed him that "allowance is not an option." Despite the Examiner's careful study of the overwhelming weight of the scientific data supporting allowance, his supervisor further instructed him to "make it appear as if you have authority [to allow the applications] and that you are in favor of full rejection."

Understandably, Examiner Langel felt uneasy having been asked to make representations on the record that were not true. He explained that, "for moral and ethical reasons," he had no choice but to allow himself to be removed from examining all assigned BlackLight applications. Although Supervisor Silverman admitted that the removal decision had been made "partially by [him] and partially by others," he would not reveal who those "others" were.

Applicant strongly objects to Examiner Langel's removal under these egregious circumstances and demands that the PTO reinstate him immediately and allow BlackLight's applications to issue. The Secret Committee is duty bound to honor the representations and agreements made by Quality Assurance Specialist Douglas McGinty during the February 11, 2003 Interview, declaring that:

(1) Examiner Langel and the other Examiners of record have "full authority" to review the scientific data supporting lower energy states of hydrogen generated and furnished by independent third parties and, based on that review, to issue patents as deemed appropriate;

(2) Applicant should confer with the Examiners, either by telephone or in person, to review each assigned application on a claim-by-claim basis to ensure that the scientific data presented adequately supports the scope of the claims; and

(3) for those claims determined to be adequately supported by the data, a patent will issue; for any claims deemed to be inadequately supported, Applicant reserves the right to continue seeking that broader claim coverage in subsequent proceedings. [See March 6, 2003 Response filed in the '678 application.]

It was precisely because of the many prior abuses that led to this short-lived "breakthrough" that U.S. Congressman David Wu sent his Senior Legislative Assistant, Ted Liu, to attend the February 11 Interview. Prior to the Interview, a senior PTO official alleged to Mr. Liu that there was no "Secret Committee." At the Interview, Mr. Liu witnessed not only Specialist McGinty's representation that Examiner Langel had the authority to allow BlackLight's applications, but the Examiner's unequivocal statement that the applications were, in fact, allowable and that he was prepared to issue Applicant his patents right then and there. [See *supra* and Attachment P.]

Despite those representations, an anonymous group of individuals has now declared that allowance is not even an option in BlackLight's cases. Worse yet, this Secret Committee sought to leave the false impression on the record that Examiner Langel—and perhaps other Examiners of record—had the authority to allow BlackLight's applications, and that he favored the rejection of claims over allowance.

In view of this unfortunate incident, which is described in greater detail below, Applicant is entitled to a complete accounting of events leading to Examiner Langel's removal, including identification of all persons involved in making that decision.

Detailed Account of the April 14, 2003 Interview and Subsequent Discussions

As stated above, the express purpose of the April 14, 2003 Interview was to review the scientific data generated and furnished by independent third parties identified in the March 6, 2003 Response that was filed in the '678 and '693 applications in support of the lower energy states of hydrogen and to ensure that the data adequately supported the scope of the claims to secure their allowance.

Applicant had no reason to suspect that this new approach, as agreed to during the prior February 11, 2003 Interview, was about to be completely scrapped. During the subsequent April 14, 2003 Interview, Examiner Langel once again reaffirmed his long-held opinion that the scientific data submitted by Applicant confirmed the operability of his novel hydrogen technology, thus warranting patent protection. The Examiner's comments made clear that, prior to the interview, he had extensively reviewed Applicant's data, as well as the summary statements characterizing that data, appearing in the prior Responses filed in the '678 and '693 applications. Based on that review,

Examiner Langel expressed several times during the Interview his willingness to allow those cases. Those views were confirmed by the Examiner in his interview summary, which stated that "[t]he participants presented data establishing the existence of lower-energy hydrogen." [See April 14, 2003 Interview Summary Form filed in the '678 and '693 applications (Attachment F).]

Examiner Langel, however, refrained from indicating allowance of any specific claims for two stated reasons. First, a few items of submitted data summarized in the March 6 Response inexplicably could not be located in the PTO files. The Examiner wanted time to confirm the data had been made of record, as well as Applicant's description of its relevance. Second, despite Specialist McGinty's representation at the February 11 Interview that Examiner Langel had full authority to review the data and to issue claims in the two interviewed cases, the Examiner explained that he needed to advise him and Supervisor Silverman of his intention to do so.

Examiner Langel then recalled a recent visit to his office by Group Director Jacqueline Stone informing him—again, contrary to what Applicant was told at the February 11, 2003 Interview—that he did not have authority to issue Notices of Allowance, or to otherwise give indications of allowance, in any BlackLight applications. Director Stone instructed Examiner Langel that he would need Specialist McGinty's permission before doing so.

Examiner Langel did, however, note that Supervisor Silverman and Specialist McGinty had agreed before the February 11 Interview to allow claims if Applicant could show that his submitted scientific data was generated by independent third parties. The Examiner reassured counsel that he would present to his superiors the scientific data discussed at the April 14 Interview with a recommendation of allowance consistent with his past views.

Applicant's counsel agreed that it made sense to allow time for Examiner Langel to discuss the case with his superiors and for counsel to resubmit the few missing items of scientific data, whereupon arrangement was made to continue with the personal Interview on the following day, April 15th. That morning, however, counsel received a distressing telephone message from Examiner Langel that the Interview had been

canceled. The Examiner stated that Supervisor Silverman had removed him from the subject cases and that he was no longer assigned to any BlackLight applications.

Applicant's counsel immediately telephoned Examiner Langel for a further explanation of what had happened. The Examiner confirmed his removal following the meeting he had arranged with Supervisor Silverman to discuss the scientific data that had been the subject of the previous day's Interview and to advocate allowance of the claims in the two subject applications. Examiner Langel informed counsel that his supervisor refused to even look at the data and, in response to his recommendation of allowance, Supervisor Silverman told him "allowance is not an option." According to Examiner Langel he was then told: "Make it appear as if you have authority [to allow the applications] and that you are in favor of full rejection."

Examiner Langel explained that, regrettably, he had no choice but to resign from further examination of BlackLight's applications. According to the Examiner, Supervisor Silverman gave him the option of staying on, "but not really—I could not go on like this." He explained that "for moral and ethical reasons," he could no longer continue to examine his assigned cases.

Alarmed by this sudden turn of events, counsel called Supervisor Silverman the following day, April 16th, to protest Examiner Langel's removal and to seek his reinstatement. Supervisor Silverman confirmed that Examiner Langel would no longer be examining Blacklight's patent applications and that all of its cases were in the process of being consolidated and transferred to a new Examiner.

Counsel kindly requested that Supervisor Silverman explain why those cases were being transferred and who made that decision. He initially refused to discuss the matter, saying only that, "I am not going to be put on the stand and cross examined on this." Upon further prodding, Supervisor Silverman volunteered that "the decision was made partially by me and partially by others." He refused, however, to be more specific when asked to identify the "others" involved in the decision, stating "I am not going to discuss that. You can say that it was *my* decision."

Counsel then informed Supervisor Silverman of Applicant's intention to file an objection to Examiner Langel's removal and to the consolidation and transfer of BlackLight's applications to a new Examiner. Counsel explained that Applicant had

expended enormous amounts of time and money over a period of many years prosecuting BlackLight's patent applications before Examiner Langel and getting him up to speed on the claimed technology and the extensive scientific data confirming its operation. Counsel argued that it was unfair to remove Examiner Langel and transfer all of BlackLight's cases to a new Examiner just to begin the process all over again. Supervisor Silverman would hear none of it, again stating, "I'm not going to discuss it."

Applicant's counsel made one last attempt to learn the identity of the other PTO officials responsible for taking this drastic action and their reasons for doing so. Supervisor Silverman again refused this request for information, snapping at counsel, "You figure it out!" Counsel then asked the Supervisor whom they might talk to so they could "figure it out" as he had put it. Supervisor Silverman advised counsel, "Talk to whomever you want," but when asked whom specifically he had in mind, he again retorted, "I don't like to be cross-examined."[125]

At the end of the conversation, Supervisor Silverman attempted to justify the PTO's extreme actions by claiming that it was in the "best interest" to transfer the applications. But, when asked by counsel whose best interest was being served by the transfer, he refused to answer. Supervisor Silverman, however, did offer the stunning revelation that Applicant's novel hydrogen technology was "beyond Examiner Langel's technical expertise" and that all of BlackLight's cases would be consolidated and transferred to another examiner with "more technical expertise." He would not elaborate on who this new, more highly qualified Examiner might be.[126]

Needless to say, at no time during the five years Applicant had been prosecuting his patent applications before Examiner Langel—who has over thirty years of Patent Office experience—did his technical expertise ever come into question. Indeed,

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[125] Counsel has taken steps "to figure it out" and expressly reserves the right to further supplement the objections raised herein as additional facts come to light. (Attachment R)

[126] All of BlackLight's applications have now been consolidated under the direction of a newly identified Examiner, Dr. Bernard Eng-Kie Souw, whose views have been adopted by the Committee in rejecting Applicant's cases in the name of four Examiners: Examiners Kalafut, Tsang-Foster, Wells, and Tanner. Applicant notes, however, that Dr. Souw is far less experienced in patent matters than his predecessor, Examiner Langel. Furthermore, as discussed in detail below, Dr. Souw's views are not only technically inaccurate, but are also tainted due to a genuine conflict of interest based on his involvement in questionable outside business activities while examining Applicant's cases.

throughout the lengthy prosecution of these cases, counsel has been impressed with the Examiner's in-depth knowledge of chemistry and physics, as well as other scientific principles, underlying Applicant's technology. That Supervisor Silverman would raise Examiner Langel's technical competence as an issue at such a late stage of that prosecution only heightens Applicant's suspicions as to the real motivation for removing Examiner Langel.

Immediately following the conversation with Supervisor Silverman, counsel telephoned Examiner Langel one last time to apprise him of the situation and to thank him for his many years of service in examining BlackLight's applications. Examiner Langel expressed regret over his removal from those cases and confirmed that he had "learned a lot about [BlackLight's] technology." The Examiner also expressed surprise that his expertise was now being called into question.

Examiner Langel shared counsel's exasperation over the situation. Counsel asked him if he knew of any other instances in which a PTO Examiner had been instructed to represent that he had authority to allow an application when, in fact, he had no such authority, and that he favored rejecting claims when he actually wanted to allow them. The Examiner's exact words were: "I've never seen anything like it."

Frankly, neither has Applicant's counsel and, in view of these unique circumstances, Applicant must once again strenuously object to the abusive treatment to which his applications have been subjected.

The Secret Committee Has Demonstrated Extreme Bias In Its Handling of BlackLight's Patent Applications Due to a Genuine Conflict of Interest

Following Examiner Langel's unfortunate resignation from examining BlackLight's applications, the Committee consolidated those cases under a new, allegedly more experienced Examiner. Consequently, the Committee's rejections of Applicant's claims in this and other pending BlackLight applications based on inoperability due to the alleged non-existence of lower-energy hydrogen now rely heavily, if not almost exclusively, on the views expressed by that new Examiner, Dr. Bernard Eng-Kie Souw. Indeed, Dr. Souw is known to have prepared on behalf of the Committee over one

hundred pages of arguments, which in one form or another, have now found their way into all of BlackLight's cases forming the basis for the Committee's erroneous rejections.

As explained in more detail below, Dr. Souw's involvement in shaping the Committee's views in this case has raised serious concerns regarding the bias of those views due to a genuine conflict of interest. As Applicant has shown, that conflict arises out of Dr. Souw's continuing work as the lead scientist for a company he owns that provides consulting services and conducts research in the same technical fields as Applicant while Dr. Souw simultaneously examines Applicant's pending patent applications. Because Dr. Souw's biased views have so tainted the present rejections, the Committee must immediately withdraw those rejections so that the pending claims can be allowed to issue.

Rather than address the issues surrounding the impropriety of Dr. Souw's outside business interests, the Committee initially denied the existence of a conflict by falsely claiming that Dr. Souw's company was merely a former employer of the Examiner. Faced, however, with Applicant's incontrovertible evidence of Dr. Souw's continuing role as owner and lead scientist for BMS, the Committee took several new, and often inconsistent, positions in subsequent Office Actions that were no more convincing. In its latest arguments denying the existence of a conflict, the Committee contradicts itself yet again, this time by recognizing the operability of BlackLight's technology in terms of its use of hydrinos, as distinguished from BMS's related technology, which it claims "do[es] not necessarily require the use of hydrinos."

Having made that distinction, the Committee cannot have it both ways. It must either: (1) drop the § 101 and § 112 rejections in all pending BlackLight applications in recognition of the operability of its hydrino technology; or (2) concede that there is no significant difference between the technical fields practiced by BMS and BlackLight and therefore, that examination of BlackLight's cases by the current founder and lead scientist of BMS creates a genuine conflict of interest.

The Committee's Continued Refusal To Disclose the Details of Dr. Souw's Employment History Raises Serious Questions Of Whether It Is Capable Of Fairly Examining Applicant's Cases

The Committee's appointment of Dr. Souw came at a critical juncture in the examination of Applicant's pending cases. As explained above, in April 2003, Examiner Langel, one of the two original examiners assigned to these cases, had resigned from his examining duties "for moral and ethical reasons." Examiner Langel's abrupt resignation came after being instructed to misrepresent that he favored denying Applicant his patents when the record showed he wanted to allow those patents to issue, and that he had authority to grant such allowance when, in fact, he was told that "allowance is not an option."

To justify Examiner Langel's resignation after the fact, the PTO informed Applicant that his cases were being transferred and consolidated under the direction of an Examiner with "more technical experience." A few short weeks later, Dr. Souw began making appearances in Applicant's cases even though he had only a few years of experience as an Associate Examiner, as compared to Primary Examiner Langel, who had over thirty years of PTO examining experience. [See Appendix attached to the Committee's May 7, 2003 Office Action issued in U.S. App'n Ser. No. 09/513,768 ('768 application).] The questionability of the Committee's move is further demonstrated by Examiner Langel's far superior technical understanding of Applicant's technology, as compared to the erroneous arguments that permeate Dr. Souw's Appendices.

Applicant was naturally suspicious of Dr. Souw's prominent membership on the Committee given the abusive treatment Applicant has suffered during the examination of his pending applications, as already discussed. As further explained below, this new appointment prompted Applicant to raise initial questions regarding Dr. Souw's employment history after he first showed bias in examining these cases by citing his own technical papers against Applicant. Rather than answer those questions, the Committee stonewalled once again, defensively arguing that:

> [T]he employment history of examiners, including those acting in a consulting role, is irrelevant to the examination thereof, except where there is a genuine conflict of interest. [See 4/14/04 Office Action in U.S. App'n Ser. No. 09/008,947 at p. 5.]

Dr. Souw has been similarly uncooperative, although he did provide some limited information regarding his employment history by citing to his background in microwave

plasmas based on work he did almost two decades ago:

> Since the cited Examiner's papers cannot possibly have been criticized by Applicant, citing his own publication(s) does not make the Examiner's view "biased", as alleged by Applicant. In the contrary, such technical papers provide a solid evidence that the Examiner is in possession of sufficient background for evaluating Applicant's claimed invention. In this regard, the Examiner can add a further evidence of strong background in microwave plasmas generated in a resonance cavity similar to those used by Applicant, not only in theory, but also hands-on in its design, construction and routine operation, as well as in its spectroscopy, both low and high resolutions [1]. [Souw Appendix at p. 4 attached to the March 29, 2004 Office Action filed in the '768 application.]

The reference [1] cited by the Examiner as evidence of his supposed "strong background in microwave plasmas" is an article published in March 1987: Souw, Eng-Kie, Plasma density measurement in an imperfect microwave cavity, J. Appl. Phys. 61 (5), 1 March 1987.[127]

The Committee's defensive remarks regarding the irrelevancy of Dr. Souw's employment history, when contrasted with the Examiner's own remarks extolling the relevancy of that history, are truly astounding. The Committee's statements are even more remarkable in light of additional information that has come to Applicant's attention concerning Dr. Souw's engagement in questionable business activities that began before, and has continued after, all of BlackLight's pending applications were consolidated and assigned to Dr. Souw.

This information came to light only after Applicant, unable to get straight answers from the Committee regarding Dr. Souw's background, undertook his own investigation into the Examiner's employment history. That investigation uncovered a much more recent 2003 article authored by Dr. Souw, in which he admits that he works as the lead scientist for a consulting company that he co-founded, BMS Enterprise (BMS) in Herndon, Virginia, at the same time he works for the PTO examining BlackLight's

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[127] Ironically, Dr. Souw attempts to establish his credibility in evaluating Applicant's novel hydrogen technology by citing his peer-reviewed article published in the *Journal of Applied Physics*, yet argues that Applicant's article published in that very same journal does not deserve similar credibility. In taking those contradictory positions, the Committee reveals yet another double standard that only reinforces its obvious bias against Applicant.

applications. [Attachment S] Dr. Souw also admits in the article that his business activities for BMS includes work in at least two technical areas, which are identical to, and therefore compete with, those practiced by BlackLight.[128]

Given that one of those technical areas is microwave plasmas, it is highly suspicious that the Committee and Dr. Souw withheld this highly relevant, up-to-date work experience in support of his supposedly "strong background in microwave plasmas," citing instead an outdated 1987 article in support. The Committee's withholding of this critically important information lends support to Applicant's showing that Dr. Souw's ownership of, and work for, an ongoing business enterprise in competition with Applicant while examining his pending patents applications, in clear violation of the PTO's own ethics rules, constitutes a genuine conflict of interest. As a consequence, the ability of the Committee under the direction of Dr. Souw to fairly evaluate the merits of Applicant's novel hydrogen technology, yet again, has been called into serious question.

The above-mentioned article was published in *Optical Engineering* on November 2, 2003. [Souw, Bernard Eng-Kie, Coherent telescope array with self-homodyne interferometric detection for optical communications, Opt. Eng. 42(1) 3139-3157 (November 2003) (Attachment S).] As the author of that article, Dr. Souw prominently identifies himself on the first page (p. 3139) and his association with BMS as follows:

> Bernard Eng-Kie Souw
> BMS Enterprise
> P.O. Box 5524
> Herndon, Virginia 20172-5524
> E-mail: souw1@juno.com

The last page of the article (p. 3157) is particularly informative as it summarizes Dr. Souw's technical background and work experience establishing his connection to BMS as its co-founder and lead scientist. Applicant reproduces the following relevant portions of that background summary, which notably describes BMS as providing

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[128] Incredibly, since the time Applicant first brought this information to the PTO's attention in his October 14, 2004 Response filed in U.S. Patent App'n Ser. No. 09/008,947, and subsequently in other pending cases, not only has the PTO failed to seriously address the issues raised, but it continues to cite and rely on Dr. Souw's biased arguments. These actions leave Applicant no choice but to seek other avenues of relief from this unfair treatment.

consulting services in two main technical areas, microwave plasma devices and CVD diamond synthesis and applications, that are identical to those practiced by BlackLight:

> In 1985, [Bernard Eng-Kie Souw] joined Brookhaven National Laboratory (BNL) in Long Island, New York as staff member in a Star Wars project. He was awarded a Department of Energy research grant in 1993 and became Principal Investigator in a research and development project on a novel, solar blind and fieldable alpha-beta-gamma radiation detector in collaboration with Northrop-Grumman and New Jersey Institute of Technology. **About the same time he cofounded BMS Enterprise, a multi-interdisciplinary consulting company providing services mainly in microwave plasma devices and CVD diamond synthesis and applications. He left BNL in 1997 and became a patent examiner with the US Patent and Trademark Office in Arlington, Virginia until 2000, when he joined ITT Industries in Reston, Virginia as a scientist and engineering specialist in optical communications. He left ITT in 2002 to dedicate more time as lead scientist with BMS Enterprise.** [Emphasis added.]

As the Committee is no doubt aware, Applicant's novel hydrogen technology has many potential commercial applications, including the aforementioned microwave plasma devices and CVD diamond synthesis. Indeed, Applicant presently has on file two copending applications directed to these specific art areas. [See U.S. App'n Ser. No. 10/469,913, filed March 7, 2002; and PCT/US/13412, filed May 1, 2002.] Applicant has serious concerns that the overlap of these and other competitive technologies that BMS and BlackLight engage in may have affected, and will continue to affect, Dr. Souw's examination and rejection of BlackLight's applications on behalf of the Committee.

This situation is particularly disturbing in light of PTO ethics rules that prohibit patent examiners from engaging in outside business activities that conflict with their assigned administrative duties. [See *Summary of Ethics Rules* for the U.S. Patent and Trademark Office published by the U.S. Department of Commerce, Office of the General Counsel, Ethics Division (2000) (Attachment S).] As the introductory paragraph to these ethical rules makes clear, the issue involved here is one of public trust:

PUBLIC SERVICE IS A PUBLIC TRUST

> As an employee of the U.S. Patent and Trademark Office you have been placed in a position of trust and are held to a high standard of ethical conduct. This handout contains a summary of the rules set forth in conflict of interest statutes and the *Standards of Ethical Conduct for Employees of the Executive Branch.* [Ethics Rules at p. 1 (Attachment S).]

To hold examiners to this high standard of ethical conduct, the rules prohibit activities that would create a financial conflict of interest:

> **Financial Conflicts of Interest.** You may not, as part of your official Government duties, participate in any matter that will have a direct and predictable effect on your personal financial interest, unless an exemption applies. This rule applies to matters involving specific parties in which you have a financial interest and to broad policy matters that affect many entities, including ones in which you have an interest (such as a policy affecting an entire industry sector if you have stock holdings in one of the companies in the industry sector). [Ethics Rules at p. 2 (Attachment S) (emphasis in original).]

Other PTO ethic rules govern outside employment activities:

> **General Rule on Outside Activities.** You may not engage in outside employment or any other personal activity that conflicts with your Department position, including employment that requires disqualification from a significant part of your Government duties or an activity that creates an appearance of using your public office for private gain. You must disqualify yourself from participating in a matter as a Department employee which may affect the financial interests of an outside employer or in which an outside employer, or an organization in which you are an active participant, is a party or is representing a party. . . . [Ethics Rules at p. 5 (Attachment S) (emphasis in original).]

These restrictions against financial conflicts of interest and outside employment activities are further amplified with specific reference to patent examiners in the following rules:

> **Financial conflicts of Interest**
>
> Conflicts of Interests regarding Patent Examiners If you are a patent examiner, you may not participate in the review of any patent if you have a financial interest in a company that may be affected by the issuance or denial of the patent (unless your interest is in publicly-traded stock valued

at $5,000 or less in all affected companies). . . . [Ethics Rules at p. 10 (Attachment S).]

Outside Employment and Activities

Service with Non-Federal organizations If you serve as an officer or director of an outside organization, such as a professional association, you may not participate as a USPTO employee on any matter that is likely to affect the financial interests of the organization. This may preclude you from serving with organizations that are active in matters before your office. If it would benefit USPTO to have an official relationship with a private organization, you may be assigned as a liaison to the organization, in which case your service with the organization would be in an official capacity, rather than as an outside activity. However, you may not be assigned to service in an official capacity as an officer or director of a non-Federal organization (other than a standards-setting body). [Ethics Rules at p. 11-12 (Attachment S) (emphasis in original).]

The applicability of these ethics rules to the present situation cannot be seriously disputed. Dr. Souw was employed as a PTO Examiner at the same time he admits to working as the lead scientist for BMS with an apparent ownership stake in the company, which has a competing interest with BlackLight. Indeed, records indicate that Dr. Souw was a PTO employee prior to the date *Optical Engineering* first received his BMS article on February 6, 2003, and throughout the time that paper was being revised and received on May 6, 2003, and ultimately published on November 2, 2003.[129]

The article's May 6, 2003 revision date is particularly significant. It was only one day later, on May 7, 2003, that the Committee began issuing rejections in BlackLight's pending cases based on Appendices authored by Dr. Souw, starting with the '768 application. Dr. Souw's genuine conflict of interest in working for BMS during his employ as a PTO examiner—and while rejecting a competitor's patent applications no less—should be obvious to any fair-minded person and, thus, requires no further discussion.[130]

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[129] See, for example, U.S. Patent No. 6,506,648, issued January 14, 2003, which identifies Bernard Souw as the Assistant Examiner. Based on established PTO procedures, Examiner Souw is believed to have been a PTO employee when the Notice of Allowance was issued in that case, well before January 2003.

[130] Interestingly, Dr. Souw mentions in his article that he co-founded BMS in 1993 while working for BNL and that he left BNL in 1997 to join the PTO, apparently while still operating BMS. According to the article, Dr. Souw then left the PTO in 2000 to join ITT Industries as a scientist/engineer in the optical communications field until 2002, when he left "to dedicate more time as lead scientist with BMS Enterprise." [Emphasis added.] Notably, however, Dr. Souw fails to mention in the BMS article his

This clear conflict of interest is especially troubling given the many other questionable activities that have occurred in the prosecution of BlackLight's applications as documented and described above, including:

(1) the withdrawal from issue of five allowed BlackLight applications under highly suspicious circumstances involving interference by Dr. Robert Park, spokesman for the American Physical Society (APS), a BlackLight competitor;

(2) the admission by Dr. Park's APS colleague, Dr. Peter Zimmerman, that Dr. Park has a "Deep Throat" contact at the Patent Office who has provided him with information concerning BlackLight applications;

(3) the rejection of Applicant's claims based on a non-peer reviewed article posted on an Internet bulletin board authored by Dr. Zimmerman, who has bragged that while working at the State Department his agency and the Patent Office "have fought back with success" against BlackLight;

(4) Dr. Zimmerman's improper contact of scientific journals in an attempt to prevent Applicant from meeting the publication requirement imposed by the Committee before his experimental evidence would even be considered; and

(5) Examiner Wayne Langel's untimely resignation from the examination of BlackLight's applications for "moral and ethical reasons" after being

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apparent re-employment by the PTO, which failure, incidentally, does comply with at least one PTO ethics rule: "you may not use your Government title in connection with a non-Government activity." [[Ethics Rules at p. 7 (Attachment S) (emphasis in original).]

Also somewhat troubling is that Dr. Souw apparently continues to examine and issue applications in other art areas that overlap with his scientific work for BMS, including optical communications, which is the subject matter of his published article. [See, e.g., U.S. Patent No. 6,801,676, filed June 24, 2003 and issued October 5, 2004, on a "Method and apparatus for phase shifting an optical beam in an optical device with a buffer plug" (recognizing in the "Background of the Invention" section that "the need for fast and efficient optical-based technologies is increasing as Internet data traffic growth rate is overtaking voice traffic pushing the need for optical communications.")]

told to materially misrepresent the record and that "allowance is not an option" in these cases.

In view of this sordid prosecution history, Applicant is understandably outraged by the discovery that following Examiner Langel's unfortunate resignation, the Committee appointed Dr. Souw to continue carrying out its "allowance is not an option" policy while he owned and operated a competing business interest. Applicant has demanded several times that the PTO provide a complete accounting of the facts and circumstances surrounding prior questionable activities, including those summarized above. Applicant has made a similar demand for information in connection with this latest episode involving Dr. Souw's conflicted association with BMS while assigned to examine and reject BlackLight's pending patent applications. Applicant now repeats that demand for information here, including but not limited to a full disclosure of the facts and circumstances relating to:

(1) Dr. Souw's appointment as an examiner assigned to review BlackLight's pending patent applications;

(2) his outside business activities with BMS Enterprise, and with any other business ventures in which he has a financial stake or other personal interest;

(3) his contacts with any sources outside the PTO regarding the subject matter disclosed in any of BlackLight's applications; and

(4) his membership activities, or any other participation, in any professional organizations, including the APS.[131]

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[131] This information is deemed relevant to the following additional PTO ethics rule:

Appearances of Bias (non-Financial Conflicts of Interest)

Participation in Professional Organizations If you are an active member of a professional organization, such as a member of a[n] association of attorneys or patent professionals, you will be barred from participating in USPTO on matters in which that organization is a party or is representing a party. If this will interfere with your USPTO duties, you should refrain from such activities or should seek advice from the Ethics Division. . . . [PTO Ethics Rules at p. 10 (Attachment S).]

Unfortunately, like Applicant's many other reasonable information requests, this one too has been ignored by the Committee despite the serious implications of Dr. Souw's outside business activities in establishing a genuine conflict with his examination of BlackLight's pending cases. The Committee's repeated refusals to honor these requests, however, merely raise further suspicion that it is withholding information that would reinforce Applicant's already strong showing of a conflict in those cases.

When not withholding information, the Committee tries to obscure the facts by advancing irrelevant and inaccurate information that contradicts Dr. Souw's own admissions:

> Applicant's remarks concerning examiner Souw, and the article (Attachment S) are noted. This article deals with a telescope array, and does not appear to show any conflict of interest between Dr. Souw's former employer, BMS Enterprise, and his consulting involvement with the present application. [See, e.g., December 21, 2004 Advisory Action filed in U.S. App'n Ser. No. 09/362,693 at p. 2 (emphasis added).]

The Committee's carefully worded denial of Dr. Souw's obvious genuine conflict of interest only raised further suspicions by its failure to even address Applicant's basis for asserting the conflict. While the Committee claims to have noted Applicant's remarks regarding this issue, it is apparent from its initial brief response that, true to form, those remarks were wholly ignored.

The Committee's refusal to seriously address the conflict in this case is clear from its narrow focus on the subject matter of the Souw article. Although the Committee correctly notes that the article "deals with a telescope array," that fact is totally irrelevant and, thus, cannot possibly support the Committee's conclusion that the article "does not appear to show any conflict of interest." [Emphasis added.]

Applicant has never relied on the subject matter of Dr. Souw's article as a basis for establishing a conflict in the present application. Rather, as previously discussed,

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As explained in detail above, and in previous Responses, Applicant has good reason to believe that the APS, and perhaps other professional organizations, have become involved as active participants in these proceedings.

that showing is based upon Dr. Souw's admission in the background summary of the article that he co-founded BMS Enterprise and has continued to operate the company as its lead scientist.[132] In that capacity, he works in two main technical areas—microwave plasma devices and CVD diamond synthesis and applications—identical to those practiced by Applicant while also employed by the PTO to examine and reject Applicant's cases. The Committee's initial refusal to even acknowledge that aspect of Applicant's showing of a genuine conflict of interest in this case, much less discuss it, is telling and only confirms Applicant's showing that a conflict does indeed exist.

The Committee attempts to gloss over Dr. Souw's startling admission that he operates a business enterprise that competes with Applicant's business interests while examining his cases by claiming that the subject matter of the article, i.e., a telescope array, does not establish a conflict of interest "between Dr. Souw's former employer, BMS Enterprise, and his consulting involvement with the present application." [Emphasis added.] Aside from being non-responsive, this argument is also factually inaccurate and only further confirms that a conflict of interest does indeed exist.

The Committee incorrectly refers to BMS as a "former employer," in contradiction to Dr. Souw's admissions that he co-founded BMS and, therefore, is presumably a principal owner of the company, and that he continues to operate the company while employed by the PTO as an Examiner. The Committee merely compounded its error based on the alleged "former employer" status of BMS with the unfounded conclusion that no conflict of interest exists between Dr. Souw's work for BMS as its lead scientist and his work for the PTO as the Examiner primarily responsible for examining Applicant's cases. In drawing this erroneous conclusion, the Committee all but admits the obvious—that Dr. Souw's current employment with BMS does in fact create a genuine conflict of interest, which then taints the Committee's rejections in those cases.

Perhaps realizing the incoherence of its initial response regarding the issue of Dr. Souw's apparent conflict of interest, the Committee, in a subsequent Office Action,

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[132] As footnoted above, Applicant's only reference to a conflict involving the subject matter of Dr. Souw's article, i.e. optical communications, revolves around his continued examination of other patent applicants' cases in that same art. This pattern of ignoring conflicts merely provides further support for, but does not form the basis of, Applicant's clear showing that Dr. Souw is also conflicted in this case based on his ongoing work for BMS, as disclosed in the article's background summary.

drastically changed its position. Although the Committee no longer tries to mischaracterize BMS as a "former employer," astonishingly, it now argues that Dr. Souw's continued operation of that company while he examined and rejected Applicant's patent applications does not create a conflict:

> Applicant also implies (page 108) that Dr. Bernard Souw, who has been consulted during the examination of his applications, is also involved in work "competitive" to this [sic] own, which would produce a conflict of interest. The evidence offered by applicant, an article written by Dr. Souw, deals with a telescope array, which is neither an alternative form of hydrogen nor a new previously unappreciated source of energy, and thus does not appear to be competitive with the present "hydrino" or any battery based thereon. While the biographical sketch at the end of the article mentions his involvement in consulting work having to do with microwave plasma devices and CVD diamond synthesis, this would not amount to competition with the present invention or the underlying hydrinos. Diamonds are a form of carbon, and thus are not in competition with hydrogen. Microwave plasma devices are not necessarily related to hydrogen, since they are a type of device or machine. [2/11/05 Office Action at page 4 filed in U.S. App'n Ser. No. 09/110,717.]

These arguments, which attempt to downplay Dr. Souw's conflicting business activities, are no more convincing than those previously posited and, in fact, raise so many new issues, Applicant hardly knows where to begin. First, Applicant did not "imply" anything; rather, he simply quoted relevant portions of Dr. Souw's own article admitting to outside business activities that clearly conflict with technologies practiced by Applicant whose pending patent applications Dr. Souw has examined and rejected. That alone is sufficient to establish a genuine conflict of interest that fatally taints the biased views of Dr. Souw adopted by the Committee.

Second, the Committee's comment regarding "the evidence offered by Applicant" is disturbing. It is not Applicant's responsibility to "offer" evidence that the Committee itself should have produced voluntarily. Worse yet, the Committee continues to withhold additional evidence in its sole possession responsive to Applicant's information requests regarding Dr. Souw's outside business interests, which evidence would likely shed further light on the conflict issue. If and when the Committee chooses to cooperate with Applicant by turning over the requested information, there is no telling what additional

genuine conflicts of interest will be revealed based on "the evidence offered by Applicant."

Third, as previously discussed, the Committee's reliance on the subject matter of the article, i.e., a telescope array, is a "red herring" that has absolutely nothing to do with the conflict issues surrounding Dr. Souw's questionable business activities. Applicant has never once asserted that Dr. Souw's work in the area of telescope arrays creates a genuine conflict of interest in this case. For the Committee to continue to raise this as an issue merely highlights the weakness of its position denying the existence of a conflict.

Fourth, the Committee uses strained reasoning in asserting that Dr. Souw's admission to his involvement in consulting work relating to microwave plasma devices and CVD diamond synthesis "would not amount to competition with the present invention or the underlying hydrinos." As explained above, and in other numerous responses, one direct application of the BlackLight's lower-energy hydrogen technology is CVD diamond synthesis, which subject is covered by claims in one of its pending patent applications. For the Committee to ignore this plain, simple fact and weakly argue instead that "[d]iamonds are a form of carbon, and thus are not in competition with hydrogen" merely demonstrates its refusal to take the conflict issue seriously. Similarly, the Committee's excuse that "microwave plasma devices are not necessarily related to hydrogen, since they are a type of device or machine" hardly merits a response. Again, the formation of microwave plasmas is a direct application of BlackLight's lower-energy hydrogen technology as Dr. Souw himself has recognized, and is covered in its pending patent applications. Dr. Souw has recognized as much by advocating that his prior work experience provides evidence of his "strong background in microwave plasmas generated in a resonance cavity similar to those used by Applicant." [See, for example, Souw Appendix at p. 4 attached to the March 29, 2004 Office Action filed in U.S. App'n Ser. No 09/513,768.] Dr. Souw's statement regarding his decades-old work in the field of microwave plasmas applies equally to his work today in that same field for BMS, yet, mysteriously, Dr. Souw and the Committee have tried their best to keep that experience secret. Why? The Committee's failure to

address these and other salient points establishing a conflict of interest only strengthens Applicant's case.

Fifth and finally, the PTO members of the Committee know better than anyone that direct competition between the Examiner and the Applicant whose case he is examining is not the proper standard used in determining whether a conflict of interest exists. Indeed, the PTO's own Ethics Rules, as discussed above, forbid an Examiner from engaging in outside employment activities that create even the appearance of impropriety:

> **General Rule on Outside Activities.** You may not engage in outside employment or any other personal activity that conflicts with your Department position, including employment that requires disqualification from a significant part of your Government duties or an activity that creates an appearance of using your public office for private gain. . . . [Ethics Rules at p. 5 (Attachment S) (emphasis in original).]

Incredibly, after initially withholding information about Dr. Souw's outside business activities, and then trying to pass him off as a former BMS employee, the Committee once again contradicts itself in a subsequently filed Office Action begrudgingly admitting that Dr. Souw, in fact, owns the company and, therefore, "may appear to have a conflict of interest." In making that admission, however, the Committee continues to blatantly disregard the PTO's own Ethics Rules in contending that this appearance of impropriety does not prevent Dr. Souw from examining Applicant's patent cases based on the absurd argument that he does not work on fuel cells in direct competition with Applicant:

> Applicant argues . . . that examiner Bernard Souw owns a company which provides consulting services in two technical areas, microwave plasma devices and CVD diamond synthesis. While an examiner with such outside employment may appear to have a conflict of interest, such a conflict can be avoided if he refrains from either working on applications dealing with these, or working on these things in his outside employment. The present application, however, is drawn to a fuel cell, which is outside those fields, and thus would not be in competition with any consultation therein. [Final Office Action dated July 18, 2005 issued in U.S. App'n Ser. No. 09/008,947.]

Like the Committee's previous attempts to cover up Dr. Souw's obvious conflict of interest, this one too must fail. Simply put, the presence or absence of direct competition is not the standard by which conflict of interest issues are to be judged. As noted above, the admitted appearance of a conflict is alone sufficient to disqualify Dr. Souw as an examiner in this case and exclude his biased arguments.

In any case, the Committee further admits by its own arguments that Dr. Souw's work for BMS on microwave plasma devices and CVD diamond synthesis overlaps with BlackLight's business interests and, therefore, denying BlackLight its patents, including one in this case, works to Dr. Souw's economic benefit. Contrary to the Committee's misguided view of the rules on ethics, such a conflict is not avoided by Dr. Souw's alleged non-competition in the narrowly drawn field of fuel cells.

Applicant suspects that the Committee's self-serving statements quoted above are narrowly confined to avoid disclosing the full scope of Dr. Souw's outside business activities, which information Applicant has repeatedly requested for years now without the courtesy of a response. The Committee, however, has no basis for asserting that Dr. Souw's outside business activities are limited to his work on microwave plasma devices and CVD diamond synthesis. Applicant knows for a fact that these are not the only two technical fields Dr. Souw engages in for BMS, as he himself admits in the background section of the journal article unearthed by Applicant's counsel:

> [Dr. Souw] cofounded BMS Enterprise, a multi-/interdisciplinary consulting company providing services mainly [i.e., not exclusively] in microwave plasma devices and CVD diamond synthesis and applications. [Souw, Bernard Eng-Kie, Coherent telescope array with self-homodyne interferometric detection for optical communications, Opt. Eng. 42(1) at 3157 (November 2003) (Attachment S) (emphasis and explanatory note in brackets added).]

That statement makes clear that there are other technical fields in which Dr. Souw provides services through his work for BMS. The Committee's refusal to disclose this important relevant information only fuels further suspicion that Dr. Souw is secretly engaged in other technologies that conflict with those practiced by Applicant.

Applicant is also suspicious of the Committee's carefully worded statement regarding Dr. Souw's work in the fields of microwave plasmas and CVD diamond synthesis and that Applicant's '947 application is "drawn to a fuel cell, which is outside those fields, and thus would not be in competition with any consultation therein." That statement is not an affirmative declaration that Dr. Souw has refrained from working in other technical fields that may also be common to those applications he has examined or otherwise provided input.[133]

The Committee's tenuous position in this regard is also shot down by Dr. Souw himself through his own incriminating statements. For example, before counsel's independent investigation uncovered Dr. Souw's conflicting business activities for BMS, Dr. Souw proudly touted his supposed "strong background in microwave plasmas" based on his prior work experience. According to Dr. Souw, that experience was highly relevant to his qualifications for examining the subject matter of Applicant's pending cases:

> In the contrary, such technical papers provide a solid evidence that the Examiner is in possession of sufficient background for evaluating Applicant's claimed invention. In this regard, the Examiner can add a further evidence of strong background in microwave plasmas generated in a resonance cavity similar to those used by Applicant, not only in theory, but also hands-on in its design, construction and routine operation, as well as in its spectroscopy, both low and high resolutions [1]. [Souw Appendix at p. 4 attached to the March 29, 2004 Office Action filed in the '768 application.]

By Dr. Souw's own admission, his present clandestine work for BMS then also provides further evidence of his strong background in microwave plasmas similar to those used by Applicant, thus raising a genuine conflict of interest. For the Committee to limit discussion of the relevant subject matter of Applicant's cases to "fuel cells," or any other technical field supposedly outside the scope of Dr. Souw's business activities—such as plasmas, for example—is simply nonsensical.

In apparent recognition of the weakness of its prior arguments denying a conflict, the Committee again tries to defend the indefensible by taking new positions in a

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[133] Of course, once a conflict of interest has been established in even one of Applicant's cases, that is a sufficient showing that Dr. Souw's bias has infected all of Applicant's cases in which his views appear.

subsequent Office Action. [*See, e.g.,* September 9, 2005 Office Action filed in App'n Ser. No. 09/362,693; December 12, 2005 Advisory Action filed in App'n Ser. No. 09/110,694] The Committee, however, succeeds only in contradicting itself once again, most notably by recognizing the operability of BlackLight's novel hydrogen technology, which involves the use of hydrinos, as a basis for distinguishing Dr. Souw's work for BMS:

> Applicant alleges a conflict of interest on the part of Dr. Bernard Souw, who has authored Appendices, and has been consulted during the examination of the present application, since Dr. Souw's consulting firm, BMS, would be a competitor of applicant's company, Blacklight. Applicant only shows that BMS has done consulting work in two fields in which applicant believes his invention to be applicable. However, these fields are microwave plasmas and CVD analysis, which do not necessarily require the use of hydrinos, while applicant's invention (in the present application) deal with methods of making compounds that include hydrinos, which do not use microwave plasmas or CVD. Even if these were competing fields, Dr. Souw would have the option of either withdrawing from working on the present application, or refraining from working on the competing subject matter outside of the PTO. [September 9, 2005 Office Action filed App'n Ser. No. 09/362,693 at p. 4; December 12, 2005 Advisory Action filed App'n Ser. No. 09/110,694 at pp. 3-4 (emphasis added).]

Having been forced to recognize the operability of BlackLight's novel hydrogen technology based on the required use of hydrinos to distinguish it from Dr. Souw's work for BMS in attempting to avoid a conflict of interest,[134] the Committee is obliged to withdraw its rejections of Applicant's claims under § 101 and § 112. Should it otherwise maintain those rejections on the basis that hydrinos do not exist, the Committee must then concede by its latest arguments that Dr. Souw's clandestine work for BMS is not sufficiently distinguishable from Applicant's hydrogen technology to avoid a conflict.

The Committee's reliance on the existence of hydrinos to avoid Applicant's conflict of interest charge, while appreciated, once again ignores the broad grounds upon which that charge was based. The Committee notably still fails to address the obvious economic benefit to Dr. Souw through BMS in denying BlackLight its patents on

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[134] That is not to say that the Committee necessarily avoids a conflict of interest based on Dr. Souw's work involving the same technical subject matter as that of Applicant.

related technology and the Committee's duty to avoid even the appearance of impropriety under the PTO's Ethics Rules. In essence, the Committee is arguing that, for there to be a conflict of interest in this case, Dr. Souw's outside business activities would have to infringe patent claims he is assigned to examine were those claims to issue. That is clearly not the proper standard for evaluating whether or not a conflict of interest exists.

The Committee's arguments denying a conflict of interest in this case are noteworthy in two other significant respects. First, its argument that Dr. Souw's work for BMS in the fields of microwave plasmas and CVD analysis "do not necessarily require the use of hydrinos" leaves open the possibility that these fields may in fact involve BMS's use of hydrinos in some capacity. Of course, Applicant may never know due to the Committee's continued refusal to respond to Applicant's reasonable request to fully disclose the extent of Dr. Souw's improper business activities.

Second, the Committee's argument that "Applicant only shows that BMS has done consulting work in two fields in which applicant believes his invention to be applicable" completely disregards the fact that these two fields practiced by BMS and BlackLight reflect a significant technological overlap between the two companies. As previously noted, the Committee also overlooks Dr. Souw's own admission of his "strong background in microwave plasmas generated in a resonance cavity similar to those used by Applicant," which experience also describes his clandestine work for BMS. Further, in criticizing Applicant for what he "only shows," the Committee again unfairly places the burden on Applicant to produce information regarding the scope of Dr. Souw's work for BMS that remains in the Committee's sole possession despite Applicant's repeated requests for that information.

Were it not for the diligence of Applicant in investigating Dr. Souw's questionable business activities, Dr. Souw would have forever kept his work for BMS a secret. Indeed, the Committee was so reluctant to disclose this information after Applicant first uncovered it that the Committee tried to pass off BMS as Dr. Souw's former employer to avoid a conflict. Having now admitted that Dr. Souw continues in his role as lead scientist for BMS while examining BlackLight's applications, it is even more critical that

the Committee stop stonewalling Applicant's information requests seeking the full extent of Dr. Souw's clandestine business activities.

Notwithstanding the Committee's refusal to cooperate, Applicant believes he has gathered sufficient evidence to establish a genuine conflict of interest for all the reasons previously stated. The Committee acknowledges as much by its further strained argument that the conflict can simply be erased because Dr. Souw has the "option of either withdrawing from working on the present application, or refraining from working [for BMS] on the competing subject matter outside of the PTO."[135] The Committee could not be more wrong on this point. Inasmuch as Dr. Souw has already "poisoned the well" with his biased views, it is ridiculous to now suggest that Dr. Souw can somehow inoculate himself from conflict charges by having the mere option of discontinuing his role as lead examiner for the Committee or lead scientist for BMS on the competing subject matter. Applicant has already been severely harmed by a conflict of interest that the Committee has all but admitted, and it is incomprehensible how the Committee's so-called "option" can possibly undo that damage.

Of course, once the Committee comes clean with a full disclosure of all of Dr. Souw's outside business activities, his contacts with outside sources regarding Applicant's technology, and his involvement with any professional organizations, as requested above, other conflicts may also emerge and Applicant anxiously awaits that information.[136] In the meantime, the Committee only adds to the injustice perpetrated against Applicant by maintaining the rejections of record, which have been contaminated by Dr. Souw's biased views. Applicant once again strenuously protests this unfair treatment and demands that the rejections in the present application be withdrawn immediately so that this case can finally be allowed to issue.

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[135] Not surprisingly, the Committee is noticeably silent as to whether Dr. Souw intends to exercise one of those so-called "options"—not that it matters, since the damage caused by Dr. Souw's biased views has already been done and neither option can possibly repair that damage.

[136] As previously noted, Applicant disputes the Committee's suggestion that it is his burden to uncover and produce this vital information. Nonetheless, Applicant is continuing to investigate these matters and will provide additional relevant information concerning Dr. Souw's questionable activities as it becomes available.

Dr. Souw's Biased Views Adopted by the Committee are Further Demonstrated by Citation to His Own Work

The genuine conflict of interest surrounding the questionable business activities of Dr. Souw is not the only source of bias he brings to this case. Dr. Souw also demonstrates extreme bias by citing two of his own technical papers published in the journal *Physica* to support the rejection of Applicant's claims on theoretical grounds.[137] This procedural miscue is inherently unfair for two obvious reasons.

First, the Committee fails to show that the journals in which Dr. Souw's technical papers appear are any more "scientifically qualified" with the appropriate review process than the journals that published Applicant's papers. Yet the Committee gives Dr. Souw's papers the "credibility that peer-reviewed articles have," while refusing to bestow that same credibility on Applicant's peer-reviewed journal articles. [See, for example, page 5 of the Committee's May 19, 2004 Office Action in U.S. App'n Ser. No. 09/362,693.] The Committee's reliance on Dr. Souw's papers merely illustrates an obvious double standard and demonstrates once again its bias against Applicant in failing to fairly consider his experimental evidence published in prestigious journals as scientifically qualified, which evidence far outweighs the scant evidence produced by Dr. Souw.

When Applicant previously pointed out that this double standard is but another example of the Committee's arbitrary and capricious handling of Applicant's cases, the Committee responded with an even more contorted argument confirming as much:

> Applicant argues (page 126) that many of his cited articles "have in fact passed the peer-review process" (emphasis applicant's). The fact that some may have passed this process does not nullify the fact that others have not. The failure to pass or undergo peer review is only one reason why applicant's evidence is unpersuasive. [See, for example, page 5 of the Committee's November 21, 2005 Office Action in U.S. App'n Ser. No. 09/110,678.]

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[137] Dr. Souw's extreme bias against Applicant is further demonstrated by his many outlandish statements adopted by the Committee, such as his comment equating Applicant's sophisticated hydrogen technology with "crop circles"! [See, e.g., the May 12, 2005 Advisory Action in U.S. App'n Ser. No. 09/669,877.]

This latest argument only further exposes the hypocrisy of the Committee's inconsistent positions. Applicant published his confidential data in peer-reviewed journal articles after the Committee required him to do so. Then, when Applicant pointed out that the Committee improperly discounted this evidence as not having been published in peer-reviewed articles, while attributing enhanced credibility to Dr. Souw's peer-reviewed articles that it relied upon, the Committee responds by arbitrarily rejecting Applicant's published evidence anyway simply because other evidence has not yet been published.[138] Unable to put forward a convincing argument based on that novel evidentiary standard, the Committee arbitrarily concocts yet another one in asserting that the journals that have peer reviewed and published Applicant's scientific evidence are not sufficiently "mainstream" to be given credible weight, a specious argument if there ever was one. [*See, e.g.,* the Committee's September 29, 2005 Office Action at p. 19 filed in U.S. App'n Ser. No. 09/669,877.] Again, the Committee, by advancing such inane arguments, succeeds only in proving Applicant's point that it has denied him a fair and expeditious hearing on his scientific evidence.

The second reason that the Committee's reliance on the views of Dr. Souw based on citation of his <u>own</u> technical papers against Applicant is inherently unfair is because Dr. Souw can no longer be viewed as an impartial judge. How can the Examiner claim to be unbiased in response to arguments criticizing his own technical papers? The answer is obvious: he can't.

In any case, now that the Committee has relied upon Dr. Souw's own scientific research to support its rejections, Applicant is entitled to know from the Committee certain details of the Examiner's background, including a complete disclosure of his technical education and past work experiences. The Committee's steadfast refusal to disclose that relevant information provides a further basis for overturning its rejections.

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[138] As previously noted, despite interference by Dr. Zimmerman—and perhaps by Dr. Park as well—in contacting various journals urging them not to publish Applicant's work, Applicant has been extremely successful in getting his articles published. Since the PTO is relying on the results of the activities of Dr. Zimmerman and/or Dr. Park denying publication of some of Applicant's articles, their involvement and interference in the prosecution of Applicant's pending applications is all the more relevant.

In a previous Office Action, the Committee tried, but failed, to rationalize why Dr. Souw should be allowed to cite without scrutiny his own technical papers against Applicant:

> Applicant note[s] the involvement of Examiner Bernard Souw in the examination of another of his applications, and that Examiner Souw had previously worked for Brookhaven National Labs. Two things are thus pointed out. First, examiners are allowed, and even encouraged, to consult other examiners on matters of science. Dr. Souw is the author of the attached Appendix. While originally written for Serial No. 09/513,768, the Appendix is considered relevant to the present application for reasons stated below. Second, the employment history of examiners, including those acting in a consulting role, is irrelevant to the examination thereof, except where there is a genuine conflict of interest. [See April 14, 2004 Office Action at p. 4 in U.S. App'n. Ser. No. 09/008,947.]

The first point—that the PTO generally encourages consultation with other Examiners—is not even in dispute and is therefore irrelevant. The present objection to the Committee's consultation of Dr. Souw is his obvious bias in citing papers he authored, which requires that he critically analyze and respond to criticisms of his own work.

The Committee's second point—that the employment history of Examiners is only relevant when there is a "genuine conflict of interest"—is a backward standard that defies common sense.[139] As Applicant aptly demonstrated above, it was only after the Committee forced him to conduct an independent investigation into Dr. Souw's relevant employment history, by improperly withholding that information, that Applicant was then able to demonstrate the existence of a genuine conflict in this case. It would have been impossible to demonstrate that conflict had Applicant not first learned of the Examiner's relevant employment history involving his ongoing ownership and operation of BMS. Thus, it comes as no surprise that the Committee would like to keep from Applicant other relevant information that may strengthen his case.

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[139] Applicant disputes that a genuine conflict of interest is actually necessary to show bias—even the appearance of a conflict should be sufficient to taint the views expressed by Dr. Souw. This point is moot, however, since genuine conflicts of interest based on Dr. Souw's outside business activities have been shown, which conflicts have fatally infected Dr. Souw's biased views adopted by the Committee.

In any event, now that Applicant has satisfied the Committee's "genuine conflict of interest" requirement, the Committee is obligated under its own backward standard to disclose the complete nature and scope of Dr. Souw's employment history so that a full determination can be made regarding the existence of other such conflicts.

Dr. Souw's Biased Views Adopted by the Committee Are Further Damaged by His Reliance on the Fraud Perpetuated by Dr. Rathke

Applicant has cited numerous examples in the preceding pages that demonstrate the extreme hostility exhibited by the Secret Committee and its most prominent member, Examiner/BMS President Souw, raising serious questions concerning the Committee's ability to fairly evaluate Applicant's claimed invention that only weaken its case. The Committee, however, has taken its extremism to a whole new level by adopting the conflicted views of Dr. Souw who now relies on dubious "evidence," including an article written by Dr. Andreas Rathke criticizing Applicant's theory as flawed by fraudulently misrepresenting mathematical equations underlying that theory. [*See, e.g.,* the September 29, 2005 Office Action filed in U.S. App'n Ser. No. 09/669,877, and November 14, 2005 Office Action filed in U.S. App'n Ser. No. 09/813,792.]

As Applicant has pointed out on numerous occasions—without even the slightest acknowledgment from Examiner/BMS President Souw—Dr. Rathke's critique is based on a misrepresentation of Applicant's theory in which he changed mathematical signs in Equations (1) and (9). In so doing, Dr. Rathke effectively fabricated new equations, which he then proceeded to "debunk" in his article. By fraudulently passing off his own debunked equations as Applicant's, Dr. Rathke has exposed himself as nothing more than a typical "mouthpiece" for the APS who totally lacks credibility in the scientific community.

That alone would be cause for great concern. Far more troubling, however, is the complicity demonstrated by the Committee and its conflicted lead Examiner, BMS President Souw, in placing its stamp of approval on the fraud perpetuated by Dr. Rathke in his article. Despite Applicant's repeated warnings against taking that extreme position, the Committee has refused to heed those warnings. [*See, e.g.,* the

Committee's September 29, 2005 Office Action filed in U.S. App'n Ser. No. 09/669,877 ("Andreas Rathke of the European Space Agency (ESA) has published an article entitled "A critical analysis of the hydrino model" in the New Journal of Physics (vol. 7 (2005) 127) and the article ***reaches the same conclusion*** as set forth by the examiner that the applicant's CQM is mathematically and scientifically flawed and does not predict the existence of hydrino states.") (Emphasis added.)]

Indeed, after being advised of Dr. Rathke's fraudulent analysis, Dr. Souw has not only refused to disavow it, but rather, has embraced that analysis even more vigorously, essentially adopting it as his own:

> A. Rathke, *"A critical analysis of the hydrino model",* New Journal of Physics, Vo.7 (2005) page 127, prov[es] that Applicant's electron wave function ρ in the form of δ function (Rathke's Eq.5-7) is not at all a solution of the corresponding wave equation (Rathke's Eq.1). **Rathke's result is essentially the same as the Examiner's Appendix** (towards the end of section 4), reciting *"rigorously performing all mathematical operations, it comes out that Applicant's wave function p(r,t) is NOT at all a solution of* ***Eq.*** *1.1 as claimed by Applicant throughout his hydrino hypothesis. That Applicant's p(r,t) is neither a solution of the Schrodinger equation is too obvious, since it does not contain the electron mass".* [November 14, 2005 Office Action filed in U.S. App'n Ser. No. 09/813,792 at 12 (emphasis added).]

By admitting that the results conveyed in Dr. Souw's Appendix is "essentially the same" as the fraudulent results discussed in Dr. Rathke's article, the Committee has discredited the entire basis for its own rejections in this case. The Committee's continued citation and reliance on that article merely perpetuates the fraud that Dr. Rathke initiated against Applicant and stands as a monumental embarrassment to the PTO.

Applicant further finds it incomprehensible that Applicant has had to publish his experimental evidence in peer-reviewed journal articles to be considered credible and to show acceptance by the scientific community, only to have the Committee ignore that evidence; yet the Committee is quick to rely on Dr. Rathke's fraudulent article and the biased views of Examiner/BMS President Souw, which so-called "evidence" no reputable member of the scientific community would accept.

In light of the awkward position the Committee now finds itself, Applicant

requests that it immediately suspend Dr. Souw from any further examination of this and all other BlackLight applications and that all rejections of record in these cases, which have been tainted by Dr. Rathke's fraudulent analysis, be withdrawn immediately so that Applicant's patents may be allowed to issue.

Should the Committee refuse to honor these requests despite the close correspondence between the Committee's analysis of Applicant's theory and Dr. Rathke's fraudulent analysis, Applicant further requests that the Committee provide any and all information relating to: (1) communications between the PTO and either Dr. Rathke or other persons with regard to Dr. Rathke or his fraudulent analysis of Applicant's theory; and (2) activities or other involvement by Dr. Rathke or others that led the Committee to adopt Dr. Rathke's fraudulent analysis.

Further Confirmation of the Committee's "Allowance is Not an Option" Policy and Its Refusal to Grant Applicant a Fair and Expeditious Hearing

Examiner Wayner Confirmed the Committee's Official Policy Not to Allow Applicant's Cases

As discussed above, Examiner Langel initially advised Applicant that a Committee of PTO officials he could not identify was responsible for authoring the Office Actions he was instructed to sign as the named Examiner of record in the cases assigned to him. Examiner Kalafut later confirmed that he was also merely the named Examiner of record and that he too did not author the Office Actions issued by the Committee in his cases. Given that these two senior PTO employees, having over 50 years of experience between them, were being used as Examiners-in-name-only by this "Secret Committee," Applicant found it odd that another named Examiner, William Wayner, would make the following statement in another BlackLight application to which he was assigned:

> For the record this Examiner makes it clear that there is no committee in charge of this application, that all of the office actions in this case have been done by me alone an[d] that I have never been told that I could not allow this application. [See April 26, 2004 Office Action issued in U.S. App'n Ser. No. 09/181,180 ('180 application).]

Applicant's initial doubt regarding the veracity of that statement was confirmed in an initial telephone conversation held on October 5, 2004, between Applicant's counsel, Jeffrey A. Simenauer, and Mr. Wayner, following his retirement from the PTO as an Examiner, and in a follow-up telephone conversation held on October 25, 2004.

Sometime in mid-September, Mr. Wayner had called and left Mr. Simenauer, a former PTO colleague, a telephone message informing him of his retirement and his desire to secure patent search work to do in his spare time. Mr. Simenauer returned Mr. Wayner's call and spoke to him on October 5th about doing some possible work, after which the conversation turned to Mr. Wayner's involvement in the examination of the '180 application. The substance of that conversation was confirmed in an e-mail Mr. Simenauer sent to Mr. Wayner on October 15, 2004. [See Attachment S.]

During the October 5 phone conversation, Mr. Wayner was very candid in complimenting Dr. Mills for the way he had handled himself during the February 11, 2003 Interview, commenting that "Mills is one hell of a persuasive man" and that "he came across as very convincing" at the Interview. In his October 15 e-mail, Mr. Simenauer thanked Mr. Wayner for those comments, which he indicated had been forwarded to Dr. Mills.

Mr. Simenauer then told Mr. Wayner that, while he disagreed with the positions Mr. Wayner had expressed during the Interview, including his skepticism regarding the operability of Mills' invention, he still respected those views. Mr. Simenauer, however, made clear to Mr. Wayner that what really upset him were the questionable actions that the PTO has taken against BlackLight prejudicing its patent rights. In that regard, Mr. Simenauer recalled Examiner Langel's resignation from examining Applicant's cases "for moral and ethical reasons" due to instructions he had been given to misrepresent the record to promote the PTO's "allowance is not an option" policy. Specifically, Mr. Simenauer reminded Mr. Wayner of how Examiner Langel was told to say that he was against allowing Dr. Mills' applications, when in fact he favored doing so, and that he had authority to issue Dr. Mills his patents, when he clearly had no such authority.

Mr. Wayner confirmed this official position of the Patent Office "not to allow [Dr. Mills'] cases" and admitted that he could not tell Mr. Simenauer this while he was still

working at the PTO. As stated in his October 15 e-mail, Mr. Simenauer appreciated Mr. Wayner's honesty and understood why he had previously remained silent.

As further stated in his e-mail, Mr. Simenauer had first decided not to ask Mr. Wayner to go "on the record" with this information, given that Applicant already had a record of Examiner Langel's statements that the PTO had in place an "allowance is not an option" policy and that he was asked to misrepresent his authority to issue patents in BlackLight's cases. Mr. Simenauer mentioned, however, that a problem had arisen that had caused him to reconsider that decision. Mr. Simenauer explained that his review of Mr. Wayner's last Office Action in the '180 application had turned up the above-quoted statement that "I [Wayner] have never been told that I could not allow this application," which contradicted what Mr. Wayner had told Mr. Simenauer previously on the phone regarding his lack of authority to allow it.

In view of Examiner Langel's admission that he was told by senior PTO officials that he did not have authority to allow BlackLight's applications under any circumstances, but that he should give the false impression that he did have such authority, Mr. Simenauer expressed concern in his October 15 e-mail that the PTO might have put Mr. Wayner in a similar uncomfortable position when he stated that he had authority to allow the '180 application. Mr. Simenauer then informed Mr. Wayner that, as BlackLight's patent counsel, he was obligated to press the matter. Knowing Mr. Wayner to be "a man of utmost integrity," Mr. Simenauer further stated that he felt comfortable requesting "[his] assistance in simply uncovering the true facts regarding the PTO's policy decisions that have been made against BlackLight."

In response to Mr. Simenauer's e-mail, Mr. Wayner called him on October 25, 2004 and left a message, which call was then returned the same day by Mr. Simenauer and the undersigned co-counsel, Jeffrey S. Melcher. At no time during this subsequent telephone conversation did Mr. Wayner deny the substance of his earlier October 5th conversation with Mr. Simenauer as reflected in the October 15th e-mail. Rather, Mr. Wayner started the conversation by stating, "You should know better. I don't want to get involved in this anymore." Mr. Wayner further stated that he did not want to talk any further about the subjects discussed in Mr. Simenauer's confirmation e-mail and that, in his words, "you will have to go by what's on the record," making clear to Applicant's

counsel that he would not accept their request for assistance regarding the truth of his statements in the present Office Action.

Mr. Wayner also stated that while he wanted to continue his personal friendship with Mr. Simenauer, he also wanted "to stay out of the [BlackLight] case." Mr. Simenauer apologized for troubling him with this matter and informed Mr. Wayner that he may not be able to remain out of the BlackLight case against the PTO if it were to go to trial following an appeal to the PTO Board. Somewhat nervously, Wayner responded by stating that "it is a very dangerous situation" for him, and again made clear that he did not want to talk about it any further. Mr. Simenauer told Mr. Wayner that he understood and sympathized with his situation and that he did not want to put him in the uncomfortable position of having to say anything more on the subject.

Mr. Wayner then stated that he had changed his mind about seeking search work from Mr. Simenauer as he had initially requested since, in his words, "I don't want it to look like a *quid pro quo*." Again, Mr. Simenauer expressed his understanding of the situation Mr. Wayner found himself in and that ended the conversation.

In light of these unfortunate developments, Applicant must demand that the PTO Committee cease and desist from any further attempts to cloud the administrative record in his cases so as to make it appear that the "Examiners-in-name-only" are solely responsible for its actions. As with the situation involving instructions that led to Examiner Langel's resignation "for moral and ethical reasons," Applicant further demands that the Committee provide a complete account of the facts and circumstances that led to the questionable statements appearing in the Office Action signed by Examiner Wayner in the '180 application prior to his retirement.

Examiner Tsang-Foster Has Confirmed the Committee's Refusal to Fairly Evaluate Applicant's Scientific Evidence

The Committee's "allowance is not an option" policy has been further advanced by yet another Examiner, Susy N. Tsang-Foster.[140] Examiner Tsang-Foster basically

[140] Examiner Tsang-Foster's name and signature appear at the end of Office Actions in certain BlackLight applications. Like other Examiners, whose names have appeared in various BlackLight cases, but have admitted not being responsible for the content of the Committee's Office Actions, Examiner Tsang-Foster is also believed to be merely an Examiner-in-name-only.

admits to the Committee's continued refusal to grant Applicant a fair hearing on the mountain of scientific evidence, submitted at its request, proving the existence of lower energy states of hydrogen. [See, for example, the May 12, 2005 Advisory Action issued in U.S. App'n Ser. No. 09/669,877.][141]

With now over 65 peer-reviewed articles published in respected scientific journals—and the list keeps growing—Applicant has achieved acceptance in the scientific community, which was improperly required by the Committee as a condition for patentability in this case. Rather than fully and fairly evaluate Applicant's compelling experimental evidence, the Committee now takes the extreme position that all of this evidence "detract[s] from the central issue that the hydrino does not theoretically exist." [See May 12, 2005 Advisory Action in U.S. App'n Ser. No. 09/669,877 at page 2 (emphasis added).] Out of the multitude of baseless arguments contrived by the Committee, this one truly stands out as perhaps the most outrageous.

Applicant has spent enormous amounts of effort and money complying with the PTO's arbitrary requirement that he publicly disclose his confidential data in peer-reviewed publications to prove the existence of lower-energy hydrogen. Now, incredibly, Applicant is being told that those efforts have been for naught since, according to the Committee, "all of applicant's data cannot prove what is not theoretically possible." [See May 12, 2005 Advisory Action in U.S. App'n Ser. No. 09/669,877 at page 2.] This statement is not only grossly erroneous, but it also contradicts the Committee's own prior statements. Indeed, in previous Office Actions, the Committee has responded to Applicant's criticism by vehemently denying that it was taking the position that the existence of lower-energy hydrogen was impossible. For

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[141] The Committee created another procedural morass in that case when it issued the May 12, 2005 Advisory Action, which required Applicant's response to forty-four pages of new arguments and twenty-one newly cited references. It was bad enough that the Committee included these voluminous new arguments in an Advisory Action without extending Applicant the courtesy of withdrawing the finality of the April 22, 2004 Office Action and establishing a new time period for him to respond. The Committee only made the situation more onerous by mailing its Advisory Action on May 12, 2005, almost seven months after Applicant had responded to that Final Office Action on October 22, 2004, leaving Applicant less than ten days to respond.

Applicant attempted to correct this latest abuse of PTO procedures—effectively denying him a fair hearing—by requesting that a new time period be set. That request was initially ignored and then later denied without a satisfactory explanation.

instance, Committee-member Souw tried to claim:

> Contrary to Applicant's allegation on pg. 13, 1st full paragraph, lines 2-4, the PTO's view is not at all that the existence of lower-energy hydrogen were impossible, but instead, that (a) Applicant's invention is not supported by any experimental fact or evidence, and (b) the underlying theory (i.e., GUT/CQM) fails to support the invention, because it contains too many flaws. [Souw Appendix at p. 3 attached to the Committee's Final Office Action mailed August 24, 2004 in Applicant's U.S. Ser. No. 08/467,051 (emphasis added).]

Such inconsistent positions permeate all of the Committee's Office Actions and provide further grounds for overturning the pending rejections.

As Applicant has consistently argued, the only way to settle the theoretical argument on whether lower-energy hydrogen actually exists is to properly evaluate the real-world evidence that Applicant and independent third parties have generated. For the Committee to now assert that this real-world evidence "detract[s] from the central issue that the hydrino does not theoretically exist" turns science on its head and is an embarrassment to a government agency charged with "promot[ing] the Progress of Science and useful Arts." [*See* U.S. Constitution, Art. I, Sect. 8, Clause 8.]

Summary

In sum, Applicant is completely mystified by the Secret Committee's arbitrary and often hostile approach that so far has denied him a fair and expeditious examination of his applications in confirmation of the "allowance is not an option" policy divulged by former Examiners of Applicant's cases. There is simply no other way to describe the Committee's reliance on tainted "evidence" (*e.g.,* Dr. Rathke's fraudulent article) and other questionable analyses that lower-energy hydrogen cannot exist under a haphazard framework that lacks proper legal support and instead relies on a patchwork of contrived vague and double standards—and often no standards at all. Even when Applicant meets these so-called "standards," such as those requiring him to publish his scientific evidence in peer-reviewed journals to be considered credible and to show acceptance of his technolodgy by the scientific community, the Committee simply introduces new "standards" as a further excuse to dismiss that evidence. So now,

before any of Applicant's experimental evidence can be fully considered, all of it must successfully complete the peer-review process, but only if it is published in journals that the Committee deems to be sufficiently "mainstream." And even then, the Committee still can and does ignore Applicant's evidence under the extreme view that it supposedly detracts from what the Committee considers to be the central issue in this case, *i.e.,* that the existence of lower-energy hydrogen is supposedly theoretically impossible and, therefore, is considered "incredible."

In Applicant's view, it would be far easier to nail jelly to the wall than to meet the Committee's arbitrary and capricious patentability requirements for enablement and utility. Applicant has had over $50 million of private investment in the research being conducted at BlackLight Power's 53,000-square-foot facility, resulting in the publication of over 65 peer-reviewed articles in esteemed scientific journals citing evidence of lower-energy hydrogen. The Committee's rejection of that considerable body of work based on arguments and "standards" that exalt fraudulent articles and other blatant misrepresentations over real-world evidence is an insult not just to this one applicant, but to the entire patent community which puts its trust in the U.S. Patent and Trademark Office to fairly administer the laws and regulations governing the examination process.

The Committee's continued hostile approach to examination of Applicant's patent applications led by an Examiner (BMS President Souw) whose views are clearly clouded by competing outside business interests, and its refusal to fairly consider Applicant's experimental evidence published in over 65 peer-reviewed articles, is perhaps best explained in the March 10, 2006 edition of the *Financial Times*:

> Psychologists call it **cognitive dissonance**: **the mental torment that comes from being confronted by two fundamentally opposed propositions**. Deciding between them often provokes powerful emotions – just ask Dr Randell Mills, whose claims have a habit of triggering severe bouts of cognitive dissonance among otherwise perfectly rational people.
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> * * *
>
> **Faced with making up their minds, many scientists have shown the classic symptom of cognitive dissonance: spluttering rage** (it is a safe bet that some are even now tapping out letters of complaint to this newspaper). **They simply refuse point-blank to believe that Dr Mills**

> **could have found a form of atomic energy missed by the likes of Albert Einstein and Ernest Rutherford.**
>
> * * *
>
> Not that Dr Mills cares about what mainstream scientists think about his - theory: he is too busy extracting ever more insights from it – most recently, **formulas describing the properties of molecules, something that has proved beyond the powers of quantum mechanics** . . . . [Emphasis added (Attachment T).]

The views of the Committee, expressed most prominently by Examiner/BMS President Souw, in refusing to fairly consider Applicant's evidence in favor of adopting fraudulent "evidence" is simply outrageous and displays all the signs of cognitive dissonance reported by the *Financial Times*. Applicant therefore repeats his prior demands that the present rejections be withdrawn and that Dr. Souw be replaced immediately so that the experimental evidence of record can finally be given the fair and expeditious hearing Applicant deserves, whereupon his patents can then begin issuing once again.

Demand for Information and Redress

Applicant believes that the totality of events documented above are highly relevant to the PTO's examination of all of BlackLight's patent applications and accurately describe the detrimental effects that examination has had on Applicant's patent rights. These events further demonstrate the PTO's failure to provide adequate safeguards to the interests of Applicant, including fair and expeditious examination, as contemplated by the Federal Circuit in its June 28, 2002 Decision. Applicant therefore respectfully demands that the PTO provide certain information and redress, including:

1) identification of all Examiners or other PTO personnel who were consulted, or otherwise provided input, in the examination of BlackLight's applications;

2) identification of all other persons from outside the PTO who were consulted, or otherwise provided input, in the examination of BlackLight's applications;

3) identification of all PTO officials responsible for withdrawing BlackLight's five allowed applications from issuance and a complete disclosure of the facts and circumstances surrounding that withdrawal action;

4) identification of all outside sources of information who may have precipitated, or otherwise contributed to, the PTO withdrawing BlackLight's five allowed applications from issuance and a complete disclosure of the facts and circumstances surrounding those actions;

5) a complete disclosure of the facts and circumstances surrounding the removal of Examiner Langel from examining BlackLight's applications and the transfer of those cases to a new Examiner, including, but not limited to, identification of all persons involved in those actions;

6) the information sought above in connection with the questionable statements made by Examiner Wayner in the '180 application;

7) the information sought above in connection with (a) Dr. Souw's conflict of interest in owning and operating BMS Enterprise while assigned by the PTO to examine BlackLight's pending patent applications; and (b) Dr. Souw's reliance on the fraudulent article written by Dr. Adreas Rathke to reject those applications;

8) the immediate removal of Examiner/BMS President Souw, and other members of the Secret Committee, from examining all pending BlackLight applications, and the reinstatement of Examiner Langel to his position as the Examiner of record in those cases to which he had been previously assigned;

9) the examination and issuance of all allowable BlackLight applications in accordance with the above-mentioned representations and agreements made at the February 11, 2003 Interview; and

10) as a matter of equity, the immediate issuance, without further examination, of all five of BlackLight's withdrawn patent applications due to the PTO's failure to provide the safeguards to the interests of Applicant, including fair and expeditious further examination, as contemplated by the Federal Circuit in its June 28, 2002 Decision.

Response to Arguments Raised in the Final Office Action Mailed 7 December 2006

Applicant reached agreements with the PTO during the February 11, 2003 Interview as to how it would conduct its examination of BlackLight's applications

following the tumultuous prosecution history of these cases. The Secret Committee, in its subsequent Office Actions, including the present one, has defaulted on those agreements, whereby examination in this case has reverted back to ignoring most of Applicant's scientific evidence on baseless theoretical grounds without applying reasonable patent standards in furtherance of its "allowance is not an option" policy. Despite the unfairness of these actions, Applicant will not be deterred from seeking the patent rights to which he is entitled.

With that said, Applicant now addresses and defeats the Committee's arguments presented in its latest Office Action, which primarily rely upon the biased and erroneous views of its lead Examiner, Dr. Bernard Eng-Kie Souw, including those found in the numerous Appendices he authored.[142] Applicant has rebutted each and every point raised in this Office Action and explains why each lacks merit. As previously discussed, the Committee's adoption of Dr. Souw's views to reject the claims in this case is also misguided due to his genuine conflict of interest in working as the lead scientist for a competing company (BMS Enterprise) while examining Applicant's cases and in citing his own technical papers against Applicant.

For these many reasons, the Committee's biased and erroneous rejections are simply not credible and do not stand up to Applicant's overwhelming experimental evidence of lower-energy hydrogen that the Committee has either misconstrued or dismissed altogether on highly questionable grounds. In doing so, the Committee has once again turned its back on an agreed upon standard, this time involving its self-imposed requirement that Applicant publish his experimental data supporting the existence of lower-energy hydrogen in peer-reviewed scientific journals. Applicant protests these arbitrary actions in the strongest terms possible and requests that the Committee reconsider its tenuous position and immediately allow this case to issue.[143]

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[142] Applicant further includes as part of this Response his rebuttal to Dr. Souw's Consolidated Appendix, which includes many of the same erroneous arguments found in the present Office Action.

[143] To fully comprehend the unfairness of the Committee's dismissal of Applicant's scientific data, it should first be noted that it was the Committee that required Applicant, over his strenuous objections, to publish that data in peer-reviewed scientific journals. This requirement stemmed from an Interview held on February 21, 2001, during which Examiner Vasudevan Jagannathan refused to take seriously the data presented at the Interview because it had not been subjected to the peer-review process required by most scientific journals prior to publication. For instance, as discussed above, Examiner Jagannathan

Despite the fact that the Committee has never cited any authority to support its publication requirement, Applicant expended considerable effort—not to mention millions of research dollars—complying with it. Yet, now that Applicant has published his experimental data in over 65 technical papers appearing in a number of respected scientific journals, with another 50-plus papers soon to follow, Applicant is advised that those efforts were for naught.

The arguments contained in Committee's present Office Action are astonishing for many other reasons, but mostly for the level of hostility directed at Applicant. The Committee cites no legitimate scientific evidence against Applicant to counter the voluminous real-world evidence he submitted in his peer-reviewed journal articles establishing the existence of lower-energy hydrogen. Rather, the Committee relies on the conflicted views of its lead Examiner/BMS President Souw, and on dubious articles, such as the one authored by Dr. Andreas Rathke, who criticizes Applicant's theory as flawed by fraudulently misrepresenting his mathematical equations. The Committee applies this and other fictitious "evidence" in an effort to elevate to a physical law what amounts to an outdated theory of quantum mechanics that is itself fatally flawed to make it seem as though Applicant's claimed technology is "incredible." Even the conflicted Dr. Souw has recognized that quantum theory is flawed, *i.e.*, "needs cimprovement," and that the existence of lower-energy hydrogen is not impossible. [See *supra*.]

Turning now to the Committee's specific arguments, the Committee contends on page 3 of the Action that:

> Applicant argues (pages 4-5), that the "Committee does not even mention, let alone consider, most of the certified experimental evidence" that he has submitted. Contrary to this assertion, the reasons that the evidene has not been persuasive were explained in the Office actions of paper nos. 20041214 and 20050830, and the Appendecies attached thereto. Failure to be persuaded is not the same thing as a refusal to consider. Applicant alleges that the "Secret Committee" has dismissed his evidence (pages 22-23), yet faults what he considers "erroneous arguments" in the Appendices of consultory examiner Dr. Souw (page 23),

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mischaracterized Applicant's highly reliable spectroscopic data as nothing more than a "bunch of squiggly lines."

which themselves are a consideration of evidence submitted by applicant.

The Committee improperly confuses "consideration" of evidence with "dismissal" of evidence and "erroneous arguments." Erroneous arguments based on fraudulent articles, misrepresentations of Applicant's arguments, and ignoring Applicant's evidence are not "consideration" of evidence as required under established patent law. The record shows, including the examples below, that the Committee summarily dismisses most of the experimental evidence of record, and then uses this dismissal as a basis for arguing that it considered Applicant's evidence.

The Committee's circular argument that it is not persuaded by evidence it has refused to consider, while hardly surprising, does not relieve the Committee of its obligation first to analyze all of Applicant's experimental evidence supporting his claimed invention, and second, to give detailed reasoning, if any, as to why that evidence is not persuasive. Mere conclusions that the Committee is not persuaded by Applicant's evidence is insufficient to carry its burden to properly consider the evidence of record. For this reason alone, the Committee's rejections should be overturned.

The Committee continues on page 3 of the Action by erroneously arguing that:

> Applicant repeats his previous argument (page 24) that the "Committee" has nitpicked on "theoretical grounds" and not found any "true fault with any of the data on legitimate scientific grounds", which falsely assumes that theoretical grounds and scientific grounds are somehow mutually exclusive. The previous Appendices have given both theoretical and experimental reasons for finding fault with applicant's data. For example, the Appendix to paper no. 20050830 is divided into "Experimental" and "Theoretical" parts.

Applicant sees no need to get into a philosophical debate over the differences between "theoretical" and "scientific" grounds of rejection. Even the Committee must admit that a theory is only as good as the scientific evidence supporting that theory. It should also be plain that the Committee's failure to fairly evaluate Applicant's scientific evidence in this case overshadows the theoretical nitpicking that dominates its Office Actions. To the limited extent that the Committee has commented on that evidence, Applicant's responses to those comments have shown them to be entirely without merit and based on preconceived notions that lower-energy states of hydrogen cannot

possibly exist. That is the wrong standard to apply in rejecting claims for lack of utility and insufficient disclosure under §§ 101 and 112.

On pages 3-4 of the Action, the Committee puts forward the following nonsensical argument:

> Applicant argues (page *25)* that "the level of support (or acceptance) in the scientific community, is not the proper standard for ascertaining whether an applicant has satisfied the enablement or utility requirements of Sections 112 and 101". The level of support in scientific community is not alleged to be a standard under § 101 and § 112 *per se,* but merely a reason why the examiner does not consider applicant to have met the standards of these sections, such as enabling an ordinarily skilled artisan to make and use the invention. A disclosure is evaluated for what it teaches to those skilled in the art, such skill evaluated in light of the scientific knowledge pertinent to that art. The opinions of the scientific community form part of this background knowledge.

Whether or not the Committee considers its requirement of support or acceptance in the scientific community to be a "standard under § 101 and § 112 *per se*" is wholly irrelevant. Having imposed this requirement on Applicant as a condition of patentability, it cannot be seriously argued otherwise. The Committee's latest position that the acceptance in the scientific community is "merely a reason" why the § 101 and § 112 standards are not met has no legal basis and the Committee has failed to cite to any.

This new patentability standard created by the Committee, like so many others it has imposed on Applicant in this case, is erroneous and should be withdrawn for two reasons: first, the level of support (or acceptance) in the scientific community is not the proper standard for ascertaining whether an applicant has satisfied the enablement or utitlity requirements under Sections 112 and 101, respectively; and second, even under that erroneous standard, Applicant has clearly met it by showing that his claimed invention <u>does</u> have support in the scientific community.

Regarding the Committee's misplaced reliance on its newly minted "support in the scientific community" standard to deny Applicant patent protection for his pioneering technology, that standard makes absolutely no sense and thus, not surprisingly, has no legal basis. Until recent rule changes, the PTO kept patent applications in strict

confidence. Typically, an invention disclosure would be made public only after claims were found to be allowable, whereupon the application would then be published as an issued patent. So it defies common sense to claim that applicants are required to show that their inventions have support in the scientific community, when there was no requirement until recently that a patent applicant even disclose his invention to the public until such time as a patent issues.

The irony here is that, according to the Committee's nonsensical standard, the more pioneering the invention, the more difficult it will necessarily be to show "support in the scientific community." Yet these pioneering inventions are the ones most deserving of patent protection.

This requirement that Applicant show support in the scientific community was no doubt the motivation behind the Committee's demand that Applicant publish his scientific evidence of lower energy states of hydrogen in peer-reviewed journal articles. Despite the Committee's failure to cite any legal authority for that evidentiary standard, Applicant nonetheless complied with it. As previously stated, Applicant now has over 65 peer-reviewed articles published in respected scientific journals regarding the operation of his lower-energy hydrogen technology, thus demonstrating considerable support in the scientific community.[144] Thus, by the Committee's own admission, this accomplishment establishes Applicant's satisfaction of the enablement and utility requirements under 35 U.S.C. §§ 112 and 101.

The Committee commits further error in arguing on page 4 of the Action that:

> Once again applicant faults the "Committee" for relying on Krieg (page 29), doing so because the "Committee was feeling the pressure to back up its claims." Krieg was not cited because of any "pressure", but to address a specific argument raised by applicant, that the "Committee" has failed to find any physical law the applicant has violated. Krieg makes four basic points. First, Krieg states that total energy, identified by the variable "E", is the sum of kinetic and potential energy. Second, he uses the laws

[144] As explained above, Applicant has complied with the Committee's required showing of support in the scientific community despite attempts by his competitors to undermine that support by disparaging Applicant and his technology. The extent to which members of the Committee, including BMS President Souw, have knowledge of, or involvement in, such activities, that information is highly relevant to the issue of whether Applicant's lower-energy hydrogen technology has support in the scientific community and, therefore, must be disclosed.

of electricity and magnetism to establish the potential energy of the proton-electron system. Third, he used the uncertainty principle to get an order of magnitude estimate for the momentum of an electron for a given orbit, which orbit is identified by its radius as "r". Fourth, he used calculus find the minimum value of "r" by taking the derivative of "E" and setting it equal to zero. Nowhere in Applicant's arguments about Krieg are any of these points disputed.

These arguments have no scientific basis. For one thing, it is improper to use the uncertainty principle to set the angular momentum as exactly h bar as alleged by the Krieg and the Committee. This has been pointed out by other well known theoreticians as cited in the Mills article:

80. R. L. Mills, The Fallacy of Feynman's Argument on the Stability of the Hydrogen Atom According to Quantum Mechanics, Annales de la Fondation Louis de Broglie, Vol. 30, No. 2, (2005), pp. 129-151.

For example, Lieb [E. H. Lieb, "The stability of matter", Reviews of Modern Physics, Vol. 48, No. 4, (1976), pp, 553-569] also addresses the fact that the Schrödinger equation has been accepted for over a half of a century without addressing the stability of matter. Lieb also shows that the Feynman argument is "false" due to an inappropriate application of the Heisenberg Uncertainty Principle and admonishes the misrepresentation in textbooks.

The entire argument of using the uncertainty principle to calculate exactly the Bohr formula with the corresponding radius is absolutely flawed. It is not physical, and it is not even internally consistent with standard quantum mechanics.

The many points by which this approach is flawed is detailed in Applicant's published article:

80. R. L. Mills, The Fallacy of Feynman's Argument on the Stability of the Hydrogen Atom According to Quantum Mechanics, Annales de la Fondation Louis de Broglie, Vol. 30, No. 2, (2005), pp. 129-151.

On page 4 of the Action, the Committee erroneously argues that:

> Applicant argues (pages 30-32) that in the Appendix to the Office action of 24 August 2004, Dr. Souw stated that "[t]he PTO's view is not at all that the existence of lower-energy hydrogen were [sic] impossible", which would mean that "lower energy states cannot be in violation of any

> physical law", and that the "Committee" has taken a contrary position, taking the "ground state of an electron of a hydrogen atom" to be a physical law that applicant has violated. This statement concerning the position of the "Committee" would contradict applicant's assertion (page 24), that the "Committee" has failed to identify any laws that have been violated. However, in stating Dr. Souw's position, applicant omits part of Dr. Souw's statement, where he states that "(a) Applicant's invention is not supported by any experimental fact or evidence, and (b) the underlying theory (i.e., GUT/CQM) fails to support the invention, because it contains too many flaws", the theory that Dr. Souw refers alleging the existence of lower-energy hydrogen. Since the theory behind lower-energy hydrogen is flawed (according to Dr, Souw), their existence is not supported, and the physical law concerning the "ground state" of hydrogen atoms remains accepted by the examiner.

Once again the Committee cites a non-existent law, "the physical law concerning the 'ground state,'" in a desperate attempt to discredit Applicant. There is no physical or other law regarding the ground state of hydrogen. The Committee has it entirely backwards. Applicant's invention is based on applying physical laws, such as Newton's laws and Maxwell's equations to the electron. In contrast, under principles of SQM, the Committee's so-called "physical law regarding the ground state" is a contradiction in terms as it is not based on physical laws, but rather, has been shown to violate them. Applicant finds this latest argument astonishing for additional reasons. For one thing, it is noteworthy that the Committee fails to address Dr. Souw's glaring admission that the existence of lower-energy hydrogen is not impossible. As previously noted, the Committee's assertion that Applicant's novel technology based on lower energy states of hydrogen violates physical law and thus can't possibly work contradicts the express position taken by its lead Examiner, Dr. Souw. When Applicant previously criticized the Committee for its failure to fairly consider Applicant's scientific evidence on the the basis that the existence of lower-energy hydrogen was impossible, Dr. Souw took exception to that criticism claiming that "[t]he PTO's view is not at all that the existence of lower-energy hydrogen were [sic] impossible." [See, for instance, Dr. Souw's Appendix at p. 3 attached to the Committee's August 24, 2004 Office Action filed in Applicant's U.S. App'n Ser. No. 08/467,051.] Clearly then, if Dr. Souw does not consider the existence of lower-energy hydrogen impossible, such lower energy states cannot be in violation of any physical law. In now taking a contrary position, the Committee has unwittingly

undermined the credibility of Dr. Souw and calls into question other views expressed by him.

The fact that Dr. Souw considers the lower energy states of hydrogen a possibility completely undercuts any notion that the ground state of hydrogen is a physical law. Dr. Souw's further recognition that Quantum Theory is flawed also casts doubt on his arguments equating the Schrodinger Equation and its alleged establishment of the ground state of hydrogen with a physical law that cannot be broken. Finally, Dr. Souw's refusal to properly consider Applicant's experimental evidence, as documented above, cannot be used as a basis for concluding that Applicant's invention is not sufficiently supported by such evidence. The so-called "flaws" argued by the Committee are nonexistent. Applicant has repeatedly rebutted those arguments without adequate response from the Committee, further exposing its erroneous assumption that equates the ground state of hydrogen with physical law.

The Committee's identification of the "ground state of an electron of a hydrogen atom" as a physical law that cannot be broken is akin to those who believed that the earth was flat and that the sun revolved around the earth before breakthrough scientific evidence proved them wrong. The Committee is now in the embarrassing position of dismissing Applicant's scientific evidence demonstrating that the hydrogen atom can be made stable below the ground state because to accomplish that feat would supposedly violate physical law. Such circular reasoning doe not reflect well on a governmental agency charged with promoting the progress of science. If complying with physical laws is indeed the standard the Committee is applying, then surely it must condemn SQM with all of its anomalies that have no basis in reality and embrace Applicant's CQM, which is premised in compliance with physical laws, even at the atomic level.

Furthermore, the Committee's argument regarding the stability of the hydrogen atom according to the HUP as applied by Krieg has no basis in fact, as shown thirty years ago by Lieb in the paper:

> E. H. Lieb, "The stability of matter", Reviews of Modern Physics, Vol. 48, No. 4, (1976), pp, 553-569.

and more recently by Applicant in his paper:

> 80. R. L. Mills, The Fallacy of Feynman's Argument on the Stability of the Hydrogen Atom According to Quantum Mechanics, Annales de la Fondation Louis de Broglie, Vol. 30, No. 2, (2005), pp. 129-151.

Other theoreticians, such as those at Princeton University, agree with Applicant's arguments—given in 80. R. L. Mills, The Fallacy of Feynman's Argument on the Stability of the Hydrogen Atom According to Quantum Mechanics, Annales de la Fondation Louis de Broglie, Vol. 30, No. 2, (2005), pp. 129-151—that the Heisenberg Uncertainty Principle provides no atomic stability. [See E. H. Lieb, "The stability of matter", Reviews of Modern Physics, Vol. 48, No. 4, (1976), pp, 553-569.]

Lieb [34] also addresses the fact that the Schrödinger equation has been accepted for over a half of a century without addressing the stability of matter. Lieb also shows that the Feynman argument is "false" due to an inappropriate application of the Heisenberg Uncertainty Principle and admonishes the misrepresentation in textbooks. By considering a wavefunction comprised of two components at two radii such that the electron can not have both sharply defined momentum and position in accordance with the Uncertainty Principle, Lieb shows that the radius can be arbitrarily small including zero such that the energy is negative infinity. This result is obviously not predictive of stability.

Furthermore, the approach by Feynman and Lieb are physically baseless. Attempts to prove that a system has a kinetic energy that exceeds some lower bound such that the total energy is not negative infinity is not based on physics since it ignores radiation-loss terms. More recently, Bugliaro at al. [35] have attempted to use QED to prove the stability of matter with N nonrelativistic electrons and K static nuclei of nuclear charge $\leq Ze$ that can interact with photons. Here, the problem is "rigged" since the radiation field is defined to be quantized, an ultraviolet cutoff is arbitrarily imposed, Maxwell's equations are not obeyed due to the defined properties of the polarizations, and creation and annihilation operators including the limitation of the couplings of photons to electrons via Pauli operators only. Furthermore, the proof has nothing to do with the solutions of the actual atomic energy levels. Even then, stability is only found for a nuclear charge $Z \leq 6$. Thus, it is evident that neither the Schrödinger equation,

variants thereof, or QED provide a general, self consistent, rigorous, and physical basis for the stability of matter.

Thus, Applicant has shown that Krieg's analysis on which the Committee relies is fundamentally flawed and provides no basis for its erroneous conclusion that the ground state of n=1 is a physical law that cannot be violated. It comes as no surprise that this faulty analysis cited by the Committee appears in a web page. What is surprising, however, is that the Committee would place so much weight on what amounts to nothing more than internet chatter, yet dismisses out of hand Applicant's real-world scientific evidence appearing in over 60 peer-reviewed articles, based on the false assumption that what was believed to be the ground state of hydrogen is a physical law that cannot be violated. The Committee has mentioned on many previous occasions "the credibility that peer-reviewed articles have." That was, of course, until Applicant began meeting, and far exceeding, the new standard of patentability the Committee imposed on him to publish his scientific evidence. The time has come for the Committee to stop arbitrarily manufacturing excuses for dismissing that evidence and to grant Applicant the fair and expeditious examination to which he is entitled.

The Committee puts forward another irrational argument on page 5 of the Action that:

> Applicant argues (pages 39-40) that an *"APS News Online Bulletin,* dated August/September 2002, suggests that Dr. [Robert] Park is maintaining his questionable PTO contacts, apparently with the agency's blessing", thus having knowledge of Patent applications filed during 2002, and not merely of applicant's applications at various times during the year 2000, and further states that the subject matter of such applications "is supposedly kept confidential". This ignores the fact the Office has been publishing Patent applications under the Pre-Grant Publications program, as early as July 2001, over a year before the date of the above-mentioned *APS News Online Bulletin.* As before, instead of a "Deep Throat" or other improper contact, the *Bulletin* was based on <u>information that was publicly available</u>.

This argument, which ignores the fact that U.S. applications are not published until 18 months after the filing date, makes no sense. Dr. Robert Park's statements make clear that he received information on applications that had been filed for less than

6 months, i.e., not publicly available, thus demonstrating that he has maintained his "Deep Throat" contact at the USPTO. The Committee's weak arguments fail to address this blatant breach of the PTO's confidentiality requirements, which suggests that Dr. Park's influence over the examination of Applicant's cases continues unabated.

The Committee further argues on pages 5-6 of the Action that:

> Applicant argues (page 135) that the "Committee" contradicts itself in the statement in the Office action of 09 September 2005, in serial no. 09/3 62,693, and in the Advisory action of 12 December 2005, in the present application, "which do not necessarily require the use of hydrinos, while applicant's invention (in the present application) deal with methods of making compounds that include hydrinos". Applicant takes this as an admission that the committee has "been forced to recognize the operability of BlackLight's novel hydrogen technology based on the required use of hydrinos to distinguish it from Dr. Souw's work". This statement was, and is, in no way whatsoever intended to be taken as an admission that the present examiner, or anyone consulted thereby, considers applicant's invention to be operable. The statement was only intended to show how Dr. Souw's work is seen as distinct from, and thus not conflicting with applicant's invention, without regard to its operability or patentability.

Once again, the Committee's arguments fall flat. Dr. Souw clearly states that his ongoing business, BMS Enterprise, does "not necessarily require the use of hydrinos." This statement is a clear recognition that hydrinos can exist and is consistent with Dr. Souw's statement that lower-energy hydrogen is not impossible. Furthermore, Dr. Souw did not specifically state that his ongoing business does not use or relate to hydrinos; only that it does not necessarily require their use. Such ambiguous statements only raise further doubts as to Dr. Souw's true intentions and expose his clear bias against Applicant.

The Committee continues to make erroneous statements on page 6 of the Action, claiming that:

> Applicant argues (pages 140, 141 and 152) that Dr. Souw has relied on a fraud made by Dr. Andreas Rathke, where Dr. Rathke changes mathematical signs in applicant's equations (1) and (9). Since the articles which Dr. Rathke cites (nos. 24 and *25,* on page 8 of his article) are not of record, whether Dr. Rathke has done what applicant alleges cannot be determined. However, it is noted that equation (1), on page 2 of the

> Rathke article appears identical to Equation (2) in applicant's attachment *58,* except that applicant uses the coordinates "r", "theta" and "phi" within the parentheses, along with "t", whereas Rathke uses only "x" and "t". No signs, such as plus or minus, appear to have been changed.

The Committee is correct in that Equation (1) of Rathke is the wave equation correctly written. It matches Applicant's Eq. (2) of article 58. The issue is that the Rathke then performs a "slight of hand" and changes the sign in the wave equation at his Eq. (9), arrives at completely erroneous solutions and falsely attributes them to the Applicant, WHICH IS OTHERWISE KNOWN AS FRAUD. This fraudulent argument and other misrepresentations by Rathke are detailed in Applicant's article:

> 113. R. Mills, "Physical Solutions of the Nature of the Atom, Photon, and Their Interactions to Form Excited and Predicted Hydrino States", New Journal of Physics, submitted.

The Committee's argument that it cannot verify what Applicant alleges because articles 24 and 25 are not of record is without merit. Applicant reproduced the relevant equations cited in articles 24 and 25 in his article 113 above, which is of record.

Furthermore, articles 24 and 25 cited by Dr. Rathke have been of record for years in this and all of Applicant's other pending applications, which is acknowledged by the named Examiner. The Committee simply ignores these publications submitted by Applicant and then argues it cannot consider Applicant's arguments because it ignored the publications. This type of circular argument is disengenuous. Applicant requests that the Committee stop the nonsense and fairly consider Applicant's extensive experimental evidence of record.

The Committee argues, again incorrectly, on page 6 of the Action that:

> Applicant argues (pages 152-153) that the "Committee" provides no support for concluding, in "the pending Action", that attachments 113 and 114 speculate hydrino formation as an explanation for data not necessarily caused thereby. The Appendix to paper no. 20041214, on pages 7-12 thereof, offers several different explanations alternative explanations for the Balmer line broadening observed by applicant, and thus support for the conclusion of the "Committee".

The "several different explanations alternative explanations for the Balmer line broadening" put forth by the Committee have been shown by real world experimental evidence to be ruled out and not credible. Once again, the Committee simply ignores the experimental evidence in an effort to discredit Applicant.

Applicant repeats his previous arguments and requests that the Committee consider them. From the Committee's arguments, it is apparent that it misunderstands Stark broadening, thus, undermining its own position. A broadening of 0.16 nm corresponds to 10 eV. The observation of such large broadening with a catalyst (Ar+) and hydrogen in a microwave cell confirms Applicant's result. Such broadening can not be explained by the Stark effect or other conventional explanations. Specifically, from 49. R. L. Mills, P. Ray, B. Dhandapani, J. He, "Comparison of Excessive Balmer α Line Broadening of Inductively and Capacitively Coupled RF, Microwave, and Glow Discharge Hydrogen Plasmas with Certain Catalysts", IEEE Transactions on Plasma Science, Vol. 31, No. (2003), pp. 338-355:

> Stark broadening of hydrogen lines in plasmas can not be measured at low electron densities using conventional emission or absorption spectroscopy because it is hidden by Doppler broadening. In the case of the Lyman α line, the Stark width exceeds the Doppler width only at $n_e > 10^{17}\ cm^{-3}$ for temperatures of about $10^4\ K$ [34]. Gigosos and Cardenoso [35] give the observed Balmer α Stark broadening for plasmas of hydrogen with helium or argon as a function of the electron temperature and density. For example, the Stark broadening of the Balmer α line recorded on a $H + He^+$ plasma is only 0.033 nm with $T_e = 20{,}000\ K$ and $n_e = 1.4\,X\,10^{14}\ cm^{-3}$.
>
> The relationship between the Stark broadening $\Delta\lambda_S$ of the Balmer β line in nm, the electron density n_e in m^{-3}, and the electron temperature T_e in K is
>
> $$\log n_e = C_0 + C_1 \log(\Delta\lambda_S) + C_2[\log(\Delta\lambda_S)]^2 + C_3 \log(T_e) \qquad (5)$$
>
> where $C_0 = 22.578$, $C_1 = 1.478$, $C_2 = -0.144$, and $C_3 = 0.1265$ [36]. From Eq. (5), to get a Stark broadening of only 0.1 nm with $T_e = 9000\ K$, an electron density of about $n_e \sim 3\,X\,10^{15}\ cm^{-3}$ is required, compared to that of the argon-hydrogen plasma of $< 10^9\ cm^{-3}$ determined using a compensated Langmuir probe, over six orders of magnitude less. Regional maxima in electron densities that could give rise to Stark broadening was eliminated as a possibility. The measured electron densities did not exceed $10^9\ cm^{-3}$,

and the axial variation was weak, showing less than a factor of two change throughout the brightest region of the plasma. The high mass diffusivity of all of the species present made it unlikely that a large density gradient existed anywhere in the plasma at steady state. This result was also evident by the good fit to a Gaussian profile recorded on the argon-hydrogen plasma rather than a Voigt profile as shown in Figure 10. In addition, the line broadening for Balmer β, γ, and δ was comparable to that of Balmer α; whereas, an absence of broadening beyond the instrument width was observed for the lines of argon or helium species such as the 667.73 nm and 591.2 nm Ar I lines and 667.816 nm and 587.56 nm He I lines. Thus, the Stark broadening was also insignificant.

A linear Stark effect arises from an applied electric field that splits the energy level with principal quantum number n into $(2n-1)$ equidistant sublevels. The magnitude of this effect given by Videnovic et al. [8] is about $2\ X10^{-2}\ nm/kV\cdot cm^{-1}$. No appreciable applied electric field was present in our study; thus, the linear Stark effect should be negligible. The absence of broadening of the noble gas lines and the hydrogen lines of the controls confirmed the absence of a strong electric field. No charged resonator cavity surfaces were present since the plasmas was contained in a quartz tube with the cavity external to the tube. A microwave E-mode field does exist in the Evenson cavity that is a function of the reflected power [37-38], and the catalysis reaction is dependent on this field as discussed previously [39]. However, there is no cathode fall region and the magnitude of the microwave field is comparably much less than that found in the cathode fall region of a glow discharge cell.

The broadening is unequivocally Doppler broadening as discussed in Reference Nos. 49 and 37. The microwave-field broadening reported in the Committee's cited Luque et al. paper is six orders of magnitude too low to account for the broadening reported by Applicant (e.g. Ref. #49).

Specifically, the broadening reported in the Committee's cited reference URL: http://www.phys.tue.nl/FLTPD/Luggenhoelscher.pdf is 0.37 cm-1 with no field and 3.7 cm-1 with the application of the microwave field. The energies corresponding to these widths are $4.5\ X10^{-5}\ eV$ and $4.5\ X10^{-4}\ eV$, respectively, which is absolutely negligible compared to the >10 eV hot H found in rt-plasmas. The microwave field can not explain Applicant's results. The Committee's alternative explanation is off by six orders of magnitude. Thus, the Stark and microwave field effects originally argued by the Committee are eliminated as the basis of the broadening observed in Applicant's cells.

Applicant also objects to the way the Committee unfairly ignores Applicant's experimental evidence, while it then tries to pass off a competitor's experiments as representing those of Applicant. Applicant requests that the Committee stop with the excuses and start to fairly consider the experimental evidence of record.

Applicant further points out that the broadening in Applicant's work was observed in an Evenson microwave cell, which is one of the best known cavities for producing ions required in the case of the hydrino reaction since Ar+ and He+ are the catalyst. The broadening was found to be dependent on time and flow rate that are indicative of a chemical reaction. In contrast, Luque's experiments did not use an Evenson cavity **and were not performed with variation in the flow rate or run for long duration**. Thus, the conditions used by Luque were not representative of the present invention and thus any reliance on his experiments is misplaced.

From its statements above, it is apparent that the Committee is attempting to changs its story and wrongly attributing its back-pedaling to a misunderstanding on the part of Applicant. The Committee's shifting position is made clear from its prior statement, in which it incorrectly argued that broadening was observed and could be attributed to conventional explanations:

> Applicant points out that the reasons for Balmer line broadening are discussed in many articles, and that the observed broadening is in excess in what can be expected from known sources thereof. This is not persuasive because broadening may be caused by various means including those taken into account by applicant, and those not taken into account. In the enclosed article by Luggenholscher, et. al. , broadening equivalent to that found by applicant, shown in figure 1, is accounted for by conventionally known explanations such as the Stark effect. The enclosed article by Luque et. al. accounts for Halpha broadening using two Lorentzian mechanisms (Stark and Van der Waals) and two Gaussian mechanisms (Doppler and instrumental).

For these reasons, Applicant requests that the Committee look past failed quantum theory and the dubious experiments of Applicant's competitors and begin to fairly consider the experimental evidence of record as required under established patent law.

Conclusion

In conclusion, Applicant will only say that he remains in total disbelief that the PTO would allow Dr. Souw, with such a flagrant conflict of interest, along with the likes of Drs. Rathke, Zimmerman, and Park, to so corrupt the examination of what is probably the most pioneering invention of our time. To date, Applicant has secured over $50 million in private funding for the research being conducted at BlackLight Power's 53,000-square-foot facility, which research has resulted in the publication of over 65 peer-reviewed articles in esteemed scientific journals. Applicant will not jeopardize that investment by allowing the Committee to treat him like some crazed inventor working out of his garage. Applicant calls for the Committee to stop the nonsense and give him the fair and expeditious hearing to which the Federal Circuit has said he is entitled.

For the foregoing reasons, Applicant respectfully submits that the subject application fully satisfies the legal requirements of 35 U.S.C. §§ 101 and 112, first paragraph, and is therefore in condition for allowance. A Notice to that affect is earnestly solicited.

Respectfully submitted,
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Journal and Book Publications

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Upcoming Conference Presentations

Prior Conference Presentations

56. R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics Workshop", at the University of Milano di Politechnico, Milan, Italy, Sponsored by the POLITECNICO Foundation, March 3, 2005.
55. R. Mills, "The Hydrino: Lower-level States of the Hydrogen Atom which Have Remarkable Consequences". Invited Evening Lecture at the 17th Symposium of Plasma Physics and Radiation Technology, sponsored by the Netherlands' Physical Society Section Plasma and Gas Discharge Physics and Research School Center for Plasma Physics and Radiation Technology, Lunteren, Netherlands, March 1-2, 2005.
54. R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics Workshop", at the University of Eindhoven, Netherlands, February 28, 2005.
53. R. L. Mills, Y. Lu, M. Nansteel, J. He, A. Voigt, W. Good, B. Dhandapani, "Energetic Catalyst-Hydrogen Plasma Reaction as a Potential New Energy Source", Division of Fuel Chemistry, Session: Advances in Hydrogen Energy, 228th American Chemical Society National Meeting, August 22-26, 2004, Philadelphia, PA.
52. R. L. Mills, BlackLight Power A New Energy Source, Volta Institute, June 25, 2004, Como, Italy.
51. R. L. Mills, Y. Lu, M. Nansteel, J. He, A. Voigt, B. Dhandapani, "Energetic Catalyst-Hydrogen Plasma Reaction as a Potential New Energy Source", Division of Fuel Chemistry, Session: Chemistry of Solid, Liquid, and Gaseous Fuels, 227th American Chemical Society National Meeting, March 28-April 1, 2004, Anaheim, CA.
50. R. L. Mills, P. Ray, M. Nansteel, J. He, X. Chen, A. Voigt, B. Dhandapani, "Energetic Catalyst-Hydrogen Plasma Reaction as a Potential New Energy Source," (Division of Industrial and Engineering Chemistry Symposium), September 9, 2003, 226th American Chemical Society National Meeting, (Sept. 7–11, 2003), New York, NY.
49. B. Dhandapani, R. Mills, "Novel Liquid-Nitrogen-Condensable Molecular Hydrogen Gas" (Physical Chemistry Session) , Wednesday, June 11, 2003, 36th Middle Atlantic Regional Meeting of American Chemical Society, (June 8–11, 2003), Princeton University, Princeton, NJ.
48. P. Ray, R. Mills, "Extreme Ultraviolet Spectroscopy of Helium-Hydrogen Plasma" (Physical Chemistry Session) , Wednesday, June 11, 2003, 36th Middle Atlantic Regional

Meeting of American Chemical Society, (June 8–11, 2003), Princeton University, Princeton, NJ.

47. R. Mills, "Novel Catalytic Reaction Of Hydrogen as a Potential New Energy Source" (Catalysis Session), Tuesday, June 10, 2003, 36th Middle Atlantic Regional Meeting of American Chemical Society, (June 8–11, 2003), Princeton University, Princeton, NJ.
46. J. He, R. Mills, "TOF-SIMS and XPS Studies of Highly Stable Silicon Hydride Films" (Inorganic/Solid State Session), Monday, June 9, 2003, 36th Middle Atlantic Regional Meeting of American Chemical Society, (June 8–11, 2003), Princeton University, Princeton, NJ.
45. B. Dhandapani, R. Mills, "Low Power MPCVD Synthesis and Characterization of Diamond Films on Silicon Substrates" (Inorganic/Solid State Session) , Monday, June 9, 2003, 36th Middle Atlantic Regional Meeting of American Chemical Society, (June 8–11, 2003), Princeton University, Princeton, NJ.
44. X. Chen, R. Mills, "Calorimetric Study of Heat Generation by Catalytic Reaction of Atomic Hydrogen in Resonant Transfer Plasmas" (Fuel Cells Session) , Monday, June 9, 2003, 36th Middle Atlantic Regional Meeting of American Chemical Society, (June 8–11, 2003), Princeton University, Princeton, NJ.
43. R. L. Mills, "Novel Catalytic Reaction of Hydrogen as a Potential New Energy Source", Division of Industrial and Engineering Chemistry, "Green Chemistry in the Design of Alternative Energy Strategies", symposium, Oral Presentation, 225th ACS National Meeting, (March 23-27, 2003), New Orleans, LA.
42. R. L. Mills, "Novel Catalytic Reaction of Hydrogen as a Potential New Energy Source", Monday, November 25, Room 216, Protocol Center, TA-3, Los Alamos National Laboratory.
41. R. L. Mills, "Classical Quantum Mechanics", Monday, November 25, Room 216, Protocol Center, TA-3, Los Alamos National Laboratory.
40. R. L. Mills, Seminar: "Novel Catalytic Reaction of Hydrogen as a Potential New Energy Source", US Environmental Protection Agency, National Risk Management Research Laboratory, Sustainable Technologies Division, Cincinnati, OH, October 24, 2002.
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37. P. Ray, R. Mills, "Spectroscopic Characterization of Stationary Inverted Balmer and Lyman Populations Formed by a Catalytic Reaction of Atomic Hydrogen with Oxygen and with Certain Group I Catalysts", Eighteenth International Conference on Atomic Physics, July 28-August 2, 2002, Cambridge, Massachusetts.
36. R. M. Mayo, R. L. Mills, M. Nansteel, "Direct Plasmadynamic Conversion of Plasma Thermal Power from a Novel Plasma Source to Electricity for Microdistributed Power Applications", 40th Power Sources Conference, (June 6–13, 2002), Cherry Hill, NJ.
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34. R. L. Mills, J. Dong, J. He, B. Dhandapani, W. Good, A. Voigt, S. Hicks, M. Nansteel, E. Dayalan, P. Ray, "Novel Catalytic Reaction of Hydrogen as a Potential New Energy Source", Division of Inorganic Chemistry, Oral Presentation, 223rd ACS National Meeting, (April 7–11, 2002), Orlando, FL.
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32. R. L. Mills, J. Dong, J. He, B. Dhandapani, W. Good, A. Voigt, S. Hicks, M. Nansteel, E. Dayalan, P. Ray, "Novel Catalytic Reaction of Hydrogen as a Potential New Energy Source", Catalysis and Surface Science Secretariat, Oral Presentation, 223rd ACS National Meeting, (April 7–11, 2002), Orlando, FL.
31. R. L. Mills, J. Dong, J. He, B. Dhandapani, W. Good, A. Voigt, S. Hicks, M. Nansteel, E. Dayalan, P. Ray, "Novel Catalytic Reaction of Hydrogen as a Potential New Energy Source", Division of Physical Chemistry, Poster Presentation, 223rd ACS National Meeting, (April 7–11, 2002), Orlando, FL.
30. R. L. Mills, J. Dong, J. He, B. Dhandapani, W. Good, A. Voigt, S. Hicks, M. Nansteel, E. Dayalan, P. Ray, "Novel Catalytic Reaction of Hydrogen as a Potential New Energy

Source", Division of Physical Chemistry, Sci-Mix Poster Presentation, 223rd ACS National Meeting, (April 7–11, 2002), Orlando, FL.

29. R. Mills, "BlackLight Power Technology-A New Clean Energy Source with the Potential for Direct Conversion to Electricity", *The 8 th Annual Emerald Groundhog Day Investment Forum*, February 5, 2002, Wyndham Franklin Plaza Hotel, Philadelphia, PA, Organized by Emerald Asset Management, Lancaster, PA.
28. R. L. Mills, E. Dayalan, "Novel Alkali and Alkaline Earth Hydrides for High Voltage and High Energy Density Batteries", Proceedings of the 17th Annual Battery Conference on Applications and Advances, California State University, Long Beach, CA, (January 15-18, 2002), pp. 1-6.
27. P. Ray, R. Mills, "Spectroscopic identification of a novel catalytic reaction of hydrogen plasma", Session ET1: Lighting, American Physical Society Meeting, 54th Annual Gaseous Electronics Conference, October 9–12, 2001, Pennsylvania State University, State College, PA.
26. R. Mills, "Novel catalytic reaction of hydrogen as a potential new energy source", Division of Industrial and Engineering Chemistry; Session: Industrial Bio-Based Technology, 222nd American Chemical Society Fall National Meeting, (August 26–30, 2001), Chicago, IL.
25. R. Mills, "Spectroscopic identification of a novel catalytic reaction of hydrogen", Division of Inorganic Chemistry; Session: Catalysis, 222nd American Chemical Society Fall National Meeting, (August 26–30, 2001), Chicago, IL.
24. R. Mills, "Spectroscopic identification of a novel catalytic reaction of hydrogen", Division of Physical Chemistry; Session: Physical Chemistry Poster Session, 222nd American Chemical Society Fall National Meeting, (August 26–30, 2001), Chicago, IL.
23. R. Mills, J. He, "Spectroscopic Identification of a Novel Catalytic Reaction of Atomic Hydrogen and the Hydride Ion Product", National Hydrogen Association, 12 th Annual U.S. Hydrogen Meeting and Exposition, *Hydrogen: The Common Thread*, The Washington Hilton and Towers, Washington DC, (March 6-8, 2001).
22. R. Mills, B. Dhandapani, M. Nansteel, N. Greenig, S. Hicks, J. Dong, "Optically Measured Power Balances of Anomalous Discharges of Mixtures of Argon, Hydrogen, and Potassium, Rubidium, Cesium, or Strontium Vapor", National Hydrogen Association, 12 th Annual U.S. Hydrogen Meeting and Exposition, *Hydrogen: The Common Thread*, The Washington Hilton and Towers, Washington DC, (March 6-8, 2001).
21. R. Mills, M. Nansteel, N. Greenig, S. Hicks, "BlackLight Power Technology-A New Clean Energy Source with the Potential for Direct Conversion to Electricity", National Hydrogen

Association, 12 th Annual U.S. Hydrogen Meeting and Exposition, *Hydrogen: The Common Thread*, The Washington Hilton and Towers, Washington DC, (March 6-8, 2001).

20. R. Mills, B. Dhandapani, M. Nansteel, J. He, A. Voigt, "Identification of Compounds Containing Novel Hydride Ions by Nuclear Magnetic Resonance Spectroscopy", National Hydrogen Association, 12 th Annual U.S. Hydrogen Meeting and Exposition, *Hydrogen: The Common Thread*, The Washington Hilton and Towers, Washington DC, (March 6-8, 2001).
19. R. Mills, "BlackLight Power Technology-A New Clean Energy Source with the Potential for Direct Conversion to Electricity", *The 8 th Annual Emerald Groundhog Day Investment Forum*, February 1, 2001, Wyndham Franklin Plaza Hotel, Philadelphia, PA, Organized by Emerald Asset Management, Lancaster, PA.
18. R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Global Foundation, Inc. Orbis Scientiae entitled *The Role of Attractive and Repulsive Gravitational Forces in Cosmic Acceleration of Particles The Origin of the Cosmic Gamma Ray Bursts*, (29th Conference on High Energy Physics and Cosmology Since 1964) Dr. Behram N. Kursunoglu, Chairman, December 14-17, 2000, Lago Mar Resort, Fort Lauderdale, FL.
17. R. Mills, "BlackLight Power Technology-A New Clean Energy Source with the Potential for Direct Conversion to Electricity", Global Foundation, Inc. conference entitled *Global Warming and Energy Policy*, Fort Lauderdale, FL, November 26-28, 2000.
16. R. Mills, B. Dhandapani, N. Greenig, J. He, J. Dong, Y. Lu, and H. Conrads, "Formation of an Energetic Plasma and Novel Hydrides from Incandescently Heated Hydrogen Gas with Certain Catalysts", August National ACS Meeting (220th ACS National Meeting, Washington, DC, (August 20-24, 2000)).
15. R. Mills, J. He, and B. Dhandapani, "Novel Alkali and Alkaline Earth Hydrides", August National ACS Meeting (220th ACS National Meeting, Washington, DC, (August 20-24, 2000)).
14. R. Mills, B. Dhandapani, N. Greenig, J. He, J. Dong, Y. Lu, and H. Conrads, "Formation of an Energetic Plasma and Novel Hydrides from Incandescently Heated Hydrogen Gas with Certain Catalysts", June ACS Meeting (29th Northeast Regional Meeting, University of Connecticut, Storrs, CT, (June 18-21, 2000)).
13. Mills, J. Dong, N. Greenig, and Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Certain Catalysts", 219 th National ACS Meeting, San Francisco, California, (March 26-30, 2000).

12. R. Mills, B. Dhandapani, N. Greenig, J. He, J. Dong, Y. Lu, and H. Conrads, "Formation of an Energetic Plasma and Novel Hydrides from Incandescently Heated Hydrogen Gas with Certain Catalysts", 219 th National ACS Meeting, San Francisco, California, (March 26-30, 2000).
11. R. Mills, "Novel Hydride Compound", 219 th National ACS Meeting, San Francisco, California, (March 26-30, 2000).
10. R. Mills, J. He, and B. Dhandapani, "Novel Alkali and Alkaline Earth Hydrides", 219 th National ACS Meeting, San Francisco, California, (March 26-30, 2000).
9. R. Mills, J. Dong, N. Greenig, and Y. Lu, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Certain Catalysts", National Hydrogen Association, 11 th Annual U.S. Hydrogen Meeting, Vienna, VA, (February 29-March 2, 2000).
8. R. Mills, B. Dhandapani, N. Greenig, J. He, J. Dong, Y. Lu, and H. Conrads, "Formation of an Energetic Plasma and Novel Hydrides from Incandescently Heated Hydrogen Gas with Certain Catalysts", National Hydrogen Association, 11 th Annual U.S. Hydrogen Meeting, Vienna, VA, (February 29-March 2, 2000).
7. R. Mills, "Novel Hydride Compound", National Hydrogen Association, 11 th Annual U.S. Hydrogen Meeting, Vienna, VA, (February 29-March 2, 2000).
6. R. Mills, J. He, and B. Dhandapani, "Novel Alkali and Alkaline Earth Hydrides", National Hydrogen Association, 11 th Annual U.S. Hydrogen Meeting, Vienna, VA, (February 29-March 2, 2000).
5. R. Mills, J. Dong, Y. Lu, J. Conrads, "Observation of Extreme Ultraviolet Hydrogen Emission from Incandescently Heated Hydrogen Gas with Certain Catalysts", 1999 Pacific Conference on Chemistry and Spectroscopy and the 35th ACS Western Regional Meeting, Ontario Convention Center, California, (October 6-8, 1999).
4. R. Mills, "Novel Hydride Compound", 1999 Pacific Conference on Chemistry and Spectroscopy and the 35th ACS Western Regional Meeting, Ontario Convention Center, California, (October 6-8, 1999).
3. R. Mills, B, Dhandapani, N. Greenig, J. He, "Synthesis and Characterization of Potassium Iodo Hydride", 1999 Pacific Conference on Chemistry and Spectroscopy and the 35th ACS Western Regional Meeting, Ontario Convention Center, California, (October 6-8, 1999).
2. R. Mills, J. He, and B. Dhandapani, "Novel Hydrogen Compounds", 1999 Pacific Conference on Chemistry and Spectroscopy and the 35th ACS Western Regional Meeting, Ontario Convention Center, California, (October 6-8, 1999).

1. R. Mills, "Excess Heat Production by the Electrolysis of an Aqueous Potassium Carbonate Electrolyte", August 1991 meeting of the American Chemical Society, NY, NY.

APPLICANT'S APPENDIX RESPONSE TO EXAMINER SOUW'S "APPENDIX A"

The latest "Appendix A" from the Committee's lead Examiner, Dr. Souw, is a major disappoint, not only for its failure to fairly evaluate Applicant's experimental evidence of lower energy states, but also for its incredible lack of understanding of the nature of Applicant's invention as it relates to the most basic scientific principles. Applicant had expected that Dr. Souw, as the founder and current president of BMS Enterprise—a company that competes in some of the same scientific fields as Applicant—would have a better grasp of the concepts underlying the technology he is examining. Or it could just be that Dr. Souw is unable to put his conflicting business interests aside and fairly evaluate a competitor's invention, along with the supporting evidence submitted in this case.

In either case, the erroneous arguments that populate Dr. Souw's "Appendix A," particularly those in defense of outdated quantum theory, are untenable. Particularly disturbing is the fact that the Committee in this case has elevated Dr. Souw's distorted views of this seriously flawed theory, one that he readily admits "needs improvement," into the category of an accepted "scientific principle" upon which Applicant's invention and supporting experimental evidence is falsely proclaimed to be "incredible." This fundamental error permeates the Committee's entire analysis, which has resulted in the misguided rejections of Applicant's claims for allegedly failing to comply with the utility and enablement requirements of 35 U.S.C. §§ 101 and 112, first paragraph, respectively.

With now over 60 peer-reviewed articles in esteemed scientific journals evidencing the existence of lower energy states, along with other countless evidence, Applicant's modern quantum theory has now gained acceptance in the scientific community in accordance with one of the many new standards created by the Committee in this case. The Committee's refusal to grant Applicant a fair and expeditious hearing on that evidence, led by BMS President Souw, is a "black eye" to an agency charged with the public trust to impartially carry out its constitutional directive of promoting the progress of science. BMS President Souw's examination of this case has been anything but.

Turning now to the specific arguments in Souw AppendixA, the Committee incorrectly states on pages 1-2:

I **I. Theoretical Part** (Regarding Applicant's response to Part II of previous appendix)

(I) Sections 60, 68, 71-75, 80, 82-86, 88, 89, 91-94, 96, 97, 100, 103, 110 and 114 of Applicant's present appendix repeat arguments already refuted. In a few cases where there are new citations presented by Applicant, these arguments are incorrect. Applicant has failed to persuasively argue against Examiner's specific refutation in the previous Appendix. Instead, Applicant keeps insisting his own preposition (GUT/CQM) that has been previously rejected and disqualified by Examiner, while denying the validity of conventional quantum mechanics (referred to by Applicant as standard quantum mechanics, SQM or QM).

Applicant provides below a detailed response to each and every issue raised by the Committee showing SQM to be an outdated theory, full of mathematical flaws, that fails to account for Applicant's novel lower energy states. As further illustrated below, the Committee fails to address the vast majority of the points raised by Applicant, including the voluminous experimental evidence submitted in support of these lower energy states, which therefore stand unrebutted.

On page 2 of Souw Appendix A, the Committee further incorrectly states:

A typical example of Applicant's insistence is, *"According to SQM textbooks, the electron is in the nucleus. A theory of the hydrogen atom can not be correct if it requires that the electron is in the nucleus"* (as recited on pg. 215 of. the appendix in sect. 114, lines 7-8 filed *5/23/2005).* In basic quantum mechanics (also known as QM or SQM using Applicant's terminology), the radial electron probability density of hydrogen(like) atom is mathematically defined as $r^2R^*nl(r)Rnl(r)$ (see original Souw Appendix, pg. 11, section 9, last paragraph, which also agrees with Applicant's reference, McQuarrie, pg.22l), is identically zero at the nucleus (r=0), so there is no electron at --or going through-- the nucleus. This single error alone, of which Applicant refuses to admit, despite Examiner's repeated refutations already raised in the previous Appendix (pg.39, last paragraph), demonstrates Applicant's misunderstanding of quantum mechanics. This erroneous argument was previously advanced by Applicant and refuted by the Examiner in the previous Appendix on page 39, last paragraph. Applicant continues to misinterpret QM (quantum mechanics).

It is Dr. Souw who is grossly in error and misunderstands quantum theory. Indeed, he makes the case for Applicant and highlights the serious flaws of outdated quantum mechanics by stating r=0. The nucleus must have a radius of greater than 0! How can r ever be 0? Dr. Souw's failure to grasp this simple concept is mind-boggling.

Furthermore, **the probability density of the 1s orbital of outdated quantum theory is a maximum at r=0** as shown in Table 6-5 of McQuarrie, pg. 224. Since the radius of nuclei are not zero, rather typically 5 X 10^-15 m (Beiser, A., *Concepts of Modern Physics*, Fourth Edition, McGraw-Hill Book Company, New York, (1978), p. 409) **the probability that the electron is in the nucleus is finite**. Since this requires the electron to have infinite energy, outdated quantum theory is fatally flawed. The Committee has not refuted this argument and its entire analysis based on that flawed theory is suspect.

From 17. R. Mills, "The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory", Int. J. Hydrogen Energy, Vol. 26, No. 10, (2001), pp. 1059-1096:

According to quantum mechanics, the existence of the electron in the nucleus is the basis of spin-nuclear coupling called Fermi contact interaction [103] where $4\pi r^2\Psi^2 dr$ is not zero since the Ψ^2 is not zero and the nucleus is comprised of baryons. According to the Standard Model, baryons as opposed to leptons have structure, contain more fundamental particles--namely quarks and gluons, and are not point particles. For example, the proton has an experimentally measured radius of $r_p = 1.3\,X\,10^{-15}\,m$. The spin-nuclear coupling energy is of the order of $10^{-24}\,J$ despite the infinite Coulombic energy of the electron when found in the nucleus (i.e. $r \to 0$ in the Schrodinger equation). This consequence of quantum mechanics is further flawed since this state is experimentally disproved. The nucleus does not contain electrons [104]. Since the electron has no volume, based on this logic, the probability that an electron can capture a photon to form an excited state is zero. This internal inconsistency based on the description of the electron as a point particle probability wave does not arise in Mills classical theory of quantum mechanics. The spin nuclear energies are calculated by Mills in closed form based on first principles without the requirement that the electron is in the nucleus [105] and are in close agreement with the experimental results.

103. M. Karplus and R. N. Porter, *Atoms and Molecules an Introduction for Students of*

Physical Chemistry, The Benjamin/Cummings Publishing Company, Menlo Park, California, (1970), p. 567.

104. Beiser, A., *Concepts of Modern Physics*, Fourth Edition, McGraw-Hill Book Company, New York, (1978), p. 407.

105. R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, January 2000 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com, pp. 98-109.

On page 2 of Souw Appendix A, the Committee further incorrectly states:

> Another example of Applicant's erroneous argument is Applicant's persistent repetition of nonsensical mathematics, i.e., that Applicant's electron density solution (in the form of a 5-function) does not need to satisfy its generic differential equation. The logical flaw in the mathematics is selfevident, and has been already refuted in the Examiner's previous Appendix on pgs. 18 and 20, but insisted again in Applicant's response (see page 45 of appendix filed on 5/23/2005 in U.S. Serial No. 09/669,877).

There is no flaw in Applicant's mathematics and the Committee has not pointed out any. Applying the constraint of nonradiation to the three-dimension wave equation plus time as an equation of motion reveals that any motion in the third (radial) dimension results in radiation; thus, the two- dimensional wave equation plus time is solved to be consistent with physical laws as given in Mills GUT and 113.R. Mills, "Physical Solutions of the Nature of the Atom, Photon, and Their Interactions to Form Excited and Predicted Hydrino States", New Journal of Physics, submitted.

In contrast, outdated quantum theory is fatally flawed since the physics of an all-space-point-particle-probability wave is nonsensical. It violates all fundamental principles including conservation of energy, momentum, causality, and is not stable to radiation as discussed in the articles:

1. R. L. Mills, "Classical Quantum Mechanics", Physics Essays, Vol. 16, No. 4, December, (2003), pp. 433-498; posted with spreadsheets at http://www.blacklightpower.com/techpapers.shtml.
2. R. Mills, "Physical Solutions of the Nature of the Atom, Photon, and Their Interactions to Form Excited and Predicted Hydrino States", submitted.
3. R. L. Mills, "Exact Classical Quantum Mechanical Solutions for One- Through Twenty-Electron Atoms", in press, posted with spreadsheets at

http://www.blacklightpower.com/techpapers.shtml.
4. R. L. Mills, "The Nature of the Chemical Bond Revisited and an Alternative Maxwellian Approach", Physics Essays, Vol. 17, (2004), pp. 342-389, posted with spreadsheets at http://www.blacklightpower.com/techpapers.shtml.
5. R. L. Mills, "Maxwell's Equations and QED: Which is Fact and Which is Fiction", in press, posted with spreadsheets at http://www.blacklightpower.com/techpapers.shtml.
6. R. L. Mills, "Exact Classical Quantum Mechanical Solution for Atomic Helium Which Predicts Conjugate Parameters from a Unique Solution for the First Time", submitted, posted with spreadsheets at http://www.blacklightpower.com/techpapers.shtml.
7. R. L. Mills, "The Fallacy of Feynman's Argument on the Stability of the Hydrogen Atom According to Quantum Mechanics," Annales de la Fondation Louis de Broglie, Vol. 30, No. 2, (2005), pp. 129-151; posted at http://www.blacklightpower.com/theory/theory.shtml.
8. R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Int. J. Hydrogen Energy, Vol. 27, No. 5, (2002), pp. 565-590.
9. R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183.
10. R. Mills, The Nature of Free Electrons in Superfluid Heliumóa Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, Vol. 26, No. 10, (2001), pp. 1059-1096.
11. V. F. Weisskopf, Reviews of Modern Physics, Vol. 21, No. 2, (1949), pp. 305-315.
12. P. Pearle, Foundations of Physics, "Absence of radiationless motions of relativistically rigid classical electron", Vol. 7, Nos. 11/12, (1977), pp. 931-945.
13. A. Einstein, B. Podolsky, N. Rosen, Phys. Rev., Vol. 47, (1935), p. 777.
14. F. Laloe, Do we really understand quantum mechanics? Strange correlations, paradoxes, and theorems, Am. J. Phys. 69 (6), June 2001, 655-701.

On page 3 of Souw Appendix A, the Committee further incorrectly argues:

> (2) As per section 59, Applicant's response regarding "curve-fitting" in Condon & Shortley's work is erroneous, since said classic work involves no computer curve fitting at all, but only analytical formulas for transition probabilities and line intensities derived from first principle. This erroneous argument by Applicant illustrates his misunderstanding of QM, while confirming the Examiner's argument that Applicant's GUT/CQM is incapable of predicting/calculating line intensities and transition probabilities as derived by Condon & Shortley and applied by the Examiner in his scientific article cited on pg. 17 of the previous Appendix, which does not involves any curve fitting.

Actually, the Committee is the one that misunderstands quantum theory, as demonstrated by these arguments. Applicant's modern theory derives the closed-form equation containing fundamental constants only of all (an infinite number) of the

lifetimes of one-electron atoms. This can not be matched by outdated quantum theory. **The results given in Condon and Shortley do not match the experimental data and violate the constant maximum speed of light for the electron velocity as well as other violations of physical laws as discussed in Mills GUT, Chp 2**. As discussed in footnote 4, the mathematics of Condon and Shortly is not internally consistent. Rather it is chosen to force a result. There is no first-principles derivation that is internally consistent. This is equivalent to curve fitting to force a match with known experimental results. But, even with this clear curve-fitting, outdated quantum theory fails since the results do not match the NIST data. The Committee's failure to rebut these and other arguments presented by Applicant are telling.

On page 3 of Souw Appendix A, the Committee further incorrectly states:

> (3) As per sections 72, 74, 80, 84, *85,* 88, 89 and 91-94, Applicant's entire attempt to justify his misinterpretation of McQuarrie's formulas only reveals his total misunderstanding of his own reference, as laid open on pp.24-32 of the previous Appendix.

Applicant has provided detailed responses, which the Committee has yet to refute. Mere conclusory statements regarding "Applicant's entire attempt to justify his misinterpretation" is without basis and most certainly does not amount to evidence. The Committee has not shown how Applicant's mathematics and experimental evidence are supposedly "misinterpreted." Applicant requests that the Committee give full and fair consideration to all arguments and evidence of record.

On pages 3-4 of Souw Appendix A, the Committee further errs in stating:

> (4) As per section 64, the allegation of Examiner's "misunderstanding" Applicant's "invention" is incorrect: the statement that n=l being radiative is *Applicant's own statement,* as recited in his 83-page amendment in SN 09/009,837 filed 08/11/2004, (as recited in its first line under (A) General Argument). On page 39 of said 83-page document *Applicant* states: *"Applying Haus ~ theorem to the point particle that must have radial kinetic energy demonstrates that the Schrodinger solution for the n = 1 state of hydrogen is radiative."* Applicant is confusing the issue and not advancing prosecution by incorrectly stating that Examiner made certain scientifically incorrect statements when the record clearly indicates that the Examiner did not.

It is the Committee who is confused, not Applicant. Herman Haus derived a test

of radiation based on Maxwell's equations [Haus, H. A., "On the radiation from point charges", American Journal of Physics, 54, (1986), pp. 1126-1129]. Applying Haus's theorem to the point particle that must have radial kinetic energy demonstrates that the Schrödinger solution **for the state of hydrogen is radiative; thus, it violates Maxwell's equations**. Since none is observed for the state, QM is inconsistent with observation. The derivation is shown in the "Schrödinger Wave Functions in Violation of Maxwell's Equations" section of Ref. [1].

Maxwell's equations require a point particle be radiative under acceleration as is the case of the bound electron of outdated quantum theory. This is shown by the Haus paper as well as several others referenced in Chp 1 of Mills GUT. The Applicant's electron is NOT A POINT, rather it is an extended particle such that it does not radiate. The Committee's misplaced response indicates that it fails to understand this essential aspect of Applicant's technology.

On page 4 of Souw Appendix A, the Committee further incorrectly states:

> (5) Regarding sections 54, 61-63, 67, 68, 71, 76-78, 82, 83, 86, 87, 90-92, 94, 100, 101, 102, 104, 105, 109, 111, and 115, Applicant attacks the QM (quantum mechanics) and related theories that have been successfully verified over many decades, instead of using the opportunity to refute Examiner's arguments against GUT/CQM and justify his own theory.

Applicant has directly refuted the Committee's points. Applicant did not attack quantum theory, but rather only pointed out the many glaring flaws of that outdated theory. The Committee states that quantum theory was "successfully verified," but fails to say exactly how. Furthermore, the Committee does not respond to Applicant's arguments pointing out the many flaws, inaccurate predictions, and violations of laws inherent in quantum theory. In fact, the Committee even admits in its own Appendix that quantum theory "needs improvement" and is therefore flawed, as discussed below.

On page 4 of Souw Appendix A, the Committee further incorrectly states:

> (6) As per sections *55,* 60-63, 66, 68-70, 74-76, 79, 80, 82, 83, 88, 91, 92, *95,-97,* 102-104, 112, 116, 117 and 118, Applicant again cites his own papers that have been previously disqualified as being one or more of the types (a), (b) and (c) recited in the previous Appendix, section (A), and/or citing new references that fall again into the same category.

This statement highlights the Committee's willingness to go to any extreme to avoid fairly considering Applicant's experimental evidence. The Committee cites no legal support for its blatant "disqualification" of Applicant's evidence, nor can it. Once again, Applicant requests that the Committee honor its agreement to consider Applicant's published experimental evidence.

On pages 4-5 of Souw Appendix A, the Committee further incorrectly states:

> (7) As per section *54,* Applicant presents book reviews of his book "The Grand Unified Theory of Classical Quantum Mechanics" from persons (see for example attached copy of book review by ST. Brewer of Applicant's book R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics" [online]. Amazon.com, Inc., 1996-2005. [retrieved on 2005-09-16]. Retrieved from the Internet:URL:www.arnazon.comlgp/product/product descriptionl0963s 171 39/~ef=dpproddesc 0/1 04-07141 17-907 922?%SFencoding=UTF8&n=283 155, which is identically reproduced in Applicant's present appendix) having no authority/expertise in any of the following pertinent areas: 1) advanced physics with a thorough understanding and knowledge of Quantum Mechanics (QM) which Applicant has alleged he has refuted with his own flawed theory, or 2) plasma physics which Applicant is heavily relying on to provide experimental support for his flawed theory.

The Committee has it completely backwards. It is the quantum physicists that are incapable of understanding classical laws, like Maxwell's equations, since they simply ignore them. Indeed, quantum theory violates many laws. That is precisely why quantum theory cannot predict any real world applications.

The Committee's attack on the qualifications of Dr. Shelby Brewer are unfounded. Dr. Brewer has a distinguished career in physics. From 1985 through 1995, Dr. Brewer was Chief Executive Officer of Combustion Engineering's Nuclear Businesses (since 1990, ABB-Combustion Engineering-NP), serving as Chairman, President, and Chief Executive Officer over this period. Dr. Brewer positioned ABB-CENP as the world leader in new reactor technology. Prior to joining Combustion Engineering, Dr. Brewer was Assistant Secretary of (Nuclear) Energy, the top U.S. post in nuclear energy. Prior to that appointment by President Reagan, Dr. Brewer achieved positions of increasing line responsibility in private industry, the United States Navy, the

Massachusetts Institute of Technology, and the Atomic Energy Commission. He has 35 years of experience in the energy sector. Dr. Brewer also had a distinguished naval career as a junior officer when he was Dean of the Nuclear Power School where he authored one of the first textbooks on naval nuclear propulsion systems. He also served as Division Officer on the aircraft carrier U.S.S. Randolph where he participated in the Bay of Pigs Invasion and the recovery at sea of the first U.S. astronauts. Dr. Brewer was awarded a Bachelor of Arts and a Bachelor of Science Degree from Columbia University (New York), and Master of Science and Ph.D. Degrees in Nuclear Engineering from the Massachusetts Institute of Technology. Based on the numerous glaring errors made by the Committee, it is apparent that Dr. Brewer is far more qualified to judge physics than the Committee members.

Applicant is also highly qualified in classical laws and has been practicing physics for 20 years now. Applicant was awarded a Bachelor of Arts Degree in Chemistry, summa cum laude and Phi Beta Kappa from Franklin & Marshall College in 1982, and a Doctor of Medicine Degree from Harvard Medical School in 1986. Following a year of graduate work in electrical engineering at the Massachusetts Institute of Technology, Applicant began his research in the field of energy technology. Applicant's graduate work at MIT provided him with a strong foundation in Maxwell's equations. Based on the numerous glaring errors made by the Committee, it is quite apparent the Applicant is far more qualified in real world physics based on classical laws than the Committee members. The Committee members are far better suited for the outdated fantasy world of quantum physics where classical laws are broken and multiple dimensions exist.

With regard to plasma physics, the Committee notably ignores the qualifications of Dr. Conrads, who was the Director and Chairman of the Board of one of Germany's most prestigious National Laboratories, Institut fur Niedertemperatur-Plasmaphysik e.V.

In any case, Applicant is unaware of any patent law that requires an inventor to have certain qualifications to be entitled to a patent. Instead of making up new standards, Applicant requests that the Committee direct its attention to where the law requires, i.e., the merits of the experimental evidence of record.

On page 5 of Souw Appendix A, the Committee further incorrectly states:

> Even if the book reviewers (Drs. J. Phillips, S.T. Brewer, 0. Landvogt, ii. Farrell) might have some expertise in the pertinent area, their expert opinion does not have any weight as Opinion Evidence in case of §112/101 rejection applied in the instant case, since it is *not* supported by *factual* evidence. See MPEP § 716.01(c). *In re Chilowsky,* 306 F.2d 908, 134 USPQ 515 (CCPA 1962) (expert opinion that an application meets the requirements of *35* U.S.C. 112 is *not* entitled to any weight however, *facts* supporting a basis for deciding that the specification complies with 35 U.S.C. 112 are entitled to some weight); *In re Beattie,* 974 F.2d 1309, 24 USPQ2d 1040 (Fed. Cir. 1992) (declarations of seven persons skilled in the art offering opinion evidence praising the merits of the claimed invention were found to have little value because of a lack *factual* support).

Applicant finds these statements incredible, especially in light of the Committee's absolute refusal to deal with the facts in this case. For instance, Applicant has provided "factual support" in form of 65 peer-reviewed articles, which the Committee basically ignores.

Furthermore, the reviews by Dr. Phillips, Dr. Brewer, Dr. Landvogt, Dr. Farrell and Dr. Conrads do have factual support, and they were submitted to meet the Committee's contrived standard of "acceptance in the scientific community." Surely these well-established professionals are representative of the "scientific community." Since they represent the scientific community, their opinion is of itself "factual support" of the acceptance of Applicant's modern theory. The Committee's rejection of this evidence is just another example of its arbitrary and capricious examination of this case.

On page 5 of Souw Appendix A, the Committee further incorrectly states:

> (8) As per sections *56-58,* 60, 62, 64, 81, 87, 88, *95,* 99, 111 and 112, merely stating that the Examiner is wrong is not a valid argument.

Applicant provides detailed responses supported with experimental evidence and citations to publications, which stand unrefuted. Applicant does not merely state that the Committee is wrong, but points out in detail, with supporting argument and evidence, how and why the Committee is wrong.

On page 5 of Souw Appendix A, the Committee further incorrectly states:

(9) Regarding sections *65,* 98 and 106-108, philosophy is totally irrelevant to the real world, as already recited in the previous Appendix. Even more irrelevant is philosophical arguments in patent examination, since philosophy belongs to non-statutory subject matter.

In sections 65, 98, and 106-108, Applicant responded directly to points raised by the Committee and provided supporting evidence. If the Committee truly believes that discussing philosophical arguments is not relevant, then it should not have raised these issues in the first place.

On page 6 of Souw Appendix A, the Committee further incorrectly states:

(10) Conclusion: Since NONE of sections 54-116 of Applicant's 05/23/05 response is persuasive, the entire Theoretical Part of the previous Appendix, and hence, the Examiner's rejection of Applicant's hydrino/GUT/CQM theory, as brought up in the original Souw Appendix, stand unrefuted by Applicant. The claims based on Applicant's flawed hydrino/GUT/CQM theory thus remain appropriately rejected under § 101 and § 1124-¶1

Applicant responded to each and every point raised by the Committee in detail with supporting experimental evidence. The Committee shows a clear pattern of ignoring Applicant's arguments and evidence without basis. Applicant has also pointed out numerous glaring errors made by the Committee, which stand unrefuted.

On page 6 of Souw Appendix A, the Committee further incorrectly states:

II. General Arguments and Experimental Parts

As in the previous Theoretical Part, a majority of Applicant's response is again based on irrelevant arguments such as philosophical arguments, allegations that the Examiner made certain incorrect scientific statements when the record clearly indicates that the Examiner did not, and Applicant's continued misinterpretation of Quantum Mechanics.

(11) Applicant's irrelevant arguments are found in the following sections of his response:

Specifically regarding sect. *25,* the references Cvetanovic and Jovicevic et al. do not confirm Applicant's results, as claimed by Applicant, since none of them ever recites hydrino (see also later Sections *42-51).*

Applicant has made, and will continue to make, an honest effort to respond to

each and every argument raised by the Committee, including those that raise philosophical points. If the Committee thinks those responses are themselves too philosophical, it should not have raised such issues.

Applicant has also shown in great detail how his modern theory is mathematically sound, based on classical laws, and accurately represents the real world. Conversely, quantum theory has been shown to be outdated because it does not comply with classical laws, is mathematically flawed, and does not represent the real world. The Committee's argument on these issues are themselves replete with numerous mathematical and scientific errors as discussed in detail throughout this Response.

On page 6 of Souw Appendix A, the Committee further incorrectly states:

> Specifically regarding sections 27 and 53, there are a plethora of phenomena not yet explainable by presently existing theories, so far. This situation is fully acceptable and also understandable, since it represents evidence that science is in (perpetual) development.

Applicant appreciates the Committees admission that "science is in (perpetual) development," which is precisely why outdated quantum theory needs to be replaced with Applicant's modern theory, which gives a far more accurate picture of the nature of electrons, atoms, and molecules. In contrast, quantum theory cannot even accurately explain the single-electron hydrogen atom, including the now well-established lower energy states of hydrogen that are forbidden by that outdated theory.

On pages 6-7 of Souw Appendix A, the Committee further incorrectly states:

> However, Applicant's GUT/CQM cannot possibly provide a valid explanation for reasons that have been clearly formulated in the previous Appendix on pg.21. In order to qualify as scientifically valid, a theory must satisfy definite criteria. Among others, it must be logically (i.e., mathematically) correct and free from contradiction, both with known natural laws as well as with itself, in addition to being supported by experimental evidence. As already explained in detail throughout the previous Appendices, Applicant's GUT/CQM does not satisfy these criteria.

The Committee has not shown even one flaw in Applicant's theory. Applicant's theory accurately predicted that lower energy states of hydrogen existed and then

Applicant proved their existence with experimental evidence, now published in over 60 peer-reviewed articles. That evidence stands unrebutted.

On page 7 of Souw Appendix A, the Committee further incorrectly states:

> (12) Sections 28-30, 34 and 37 consist of scientifically unfounded assertions by Applicant, since Applicant's GUT/CQM has been already refuted in the previous Appendix. Contrary to Applicant's assertions, he has not disproved Quantum Mechanics.

This mere conclusory statement, typical of the Committee, is insufficient to rebut Applicant's statements made in Sections 28-30, 34, and 37.

On page 7 of Souw Appendix A, the Committee further incorrectly states:

> As stated by Applicant in section 34, Applicant's CQM is the first to predict novel lower-energy states of hydrogen. He is the first to predict such states because these new states of hydrogen are not supported by or accepted by conventional science.

Applicant completely agrees with the Committee that he is the inventor of lower energy states and that quantum mechanics is outdated since it does not support or accept these new energy states.

On page 7 of Souw Appendix A, the Committee further incorrectly states:

> Specifically regarding Sect. 29, Marchese's Final Report contradicts Applicant's claim of superior rocket thrust and/or excessive heat production, but only conform to the conventional thrust and/or heat from ordinary chemical reaction.

Marchese does not at all contradict Applicant's claims. As stated previously, Marchese validated Applicant's results as reported :

44. **A. J. Marchese, P. M. Jansson, J. L. Schmalzel, "The BlackLight Rocket Engine", Phase I Final Report, NASA Institute for Advanced Concepts Phase I, May 1-November 30, 2002, http://www.niac.usra.edu/files/studies/final_report/pdf/752Marchese.pdf.**

Rowan University Professors A. J. Marchese, P. M. Jansson, J. L. Schmalzel performed verification studies as visiting researchers at BlackLight Power, Cranbury, NJ. The prior reported results of BlackLight Power, Inc. of extraordinarily broadened atomic hydrogen lines, population inversion, lower-energy hydrogen lines, and excess power measured by water bath calorimetry were replicated. The application of

the energetic hydrogen to propulsion was studied.

Specifically, the data supporting hydrinos was replicated. See

i.) BlackLight Process Theory (pp. 10-12) which gives the theoretical energy levels for hydrinos and the catalytic reaction to form hydrinos,

ii.) Unique Hydrogen Line Broadening in Low Pressure Microwave Water Plasmas (pp. 25-27, particularly Fig. 21) which shows that in the same microwave cavity driven at the same power, the temperature of the hydrogen atoms in the microwave plasma where the hydrino reaction was active was 50 times that of the control based on the spectroscopic line widths,

iii.) Inversion of the Line Intensities in Hydrogen Balmer Series (pp. 27-28, particularly Fig. 22) which shows for the first time in 40 years of intensive worldwide research that atomic hydrogen population inversion was achieved in a steady state plasma and supports the high power released from the reaction of hydrogen to form hydrinos,

iv.) Novel Vacuum Ultraviolet (VUV) Vibration Spectra of Hydrogen Mixture Plasmas (pp. 28-29, particularly Fig. 23) which shows a novel vibrational series of lines in a helium-hydrogen plasmas at energies higher than any known vibrational series and it identically matches the theoretical prediction of 2 squared times the corresponding vibration of the ordinary hydrogen species, and

v.) Water Bath Calorimetry Experiments Showing Increased Heat Generation (pp. 29-30, particularly Fig. 25) that shows that with exactly the same system and same input power, the heating of the water reservoir absolutely measured to 1% accuracy was equivalent to 55 to 62 W with the catalyst-hydrogen mixture compared to 40 W in the control without the possibility of the reaction to form hydrinos.

On page 7 of Souw Appendix A, the Committee further incorrectly states:

Specifically regarding Sections 30 and 37, arguments for the incredibility of GUT/CQM have been unambiguously specified in the previous Appendix and discussed at great lengths in the previous consecutive actions, without any persuasive counterargument from Applicant.

Applicant provided detailed responses to each and every point raised by the Committee. As those responses show, the Committee has not asserted even one credible argument showing any flaw in Applicant's theory. For example, the fraudulent arguments of Dr. Rathke does NOT constitute credible evidence the Committee can properly rely on.

On pages 7-8 of Souw Appendix A, the Committee further incorrectly states:

(13) As per Sections 28, 31, 32, 33, 35, 37-39 and 43-52, these sections

> again cite Applicant's own papers that have been previously disqualified for being one or more of the types (a), (b) and (c) recited in the previous Appendix, section (A), and/or citing new references that fall again into the same category.

The Committee's arbitrary disqualification of Applicant's publications is without basis in law. Applicant spent many millions of dollars preparing the experimental evidence and then having it peer-reviewed and published at the request of the Committee. Applicant once again requests that the Committee stop hiding behind baseless arguments for disqualifying the experimental evidence of record and begin to fairly evaluate that evidence.

On page 8 of Souw Appendix A, the Committee further incorrectly states:

> Specifically regarding Sections 46 and 48, the few references cited on pg.52 and 57 written by authors other than Applicant do not mention any hydrino or GUT/CQM.

This statement highlights yet again the arbitrary manner in which the Committee is evaluating this case. The references by "other authors" were cited to demonstrate errors in the Committee's statements. The fact that these references do not mention hydrino is irrelevant. Applicant spent many hours preparing a detailed response to each point raised by the Committee and the least the Committee can do is fairly evaluate Applicant's response. Ignoring evidence on irrelevant issues is not an adequate rebuttal.

On page 8 of Souw Appendix A, the Committee further incorrectly states:

> (14) In sections 32, *35,* 36, 39, 40 and 53, Applicant makes irrelevant arguments.
>
> Specifically regarding Sect. 32, nitrogen is a gas, which is not to be compared with specific hydride(s) claimed by Applicant, which is a solid.

Applicant responded to each point raised by the Committee in sections 32, 35, 36, 39, 40 and 53 and provides experimental evidence, which the Committee simply ignores. The Committee's mere conclusion that these arguments and evidence are "irrelevant" is not well taken. The Committee has not shown how this highly accurate experimental evidence is irrelevant, which only demonstrates the arbitrary and

capricious manner in which the Committee treats Applicant's evidence.

Regarding Section 32, Applicant pointed out the obvious in explaining to the Committee what is known by all skilled persons: binding energy does not translate into hardness. The Committee makes this point for Applicant in its argument that nitrogen is a gas, even though it has a high binding energy. Thus, how can hardness be used to judge binding energy?

In Section 32, Applicant also pointed out that he measured the bonding in lower-energy hydrogen by the "gold standard," vibration-rotational spectroscopy. Thus, Applicant's experimental data is based on highly accurate modern techniques. The Committee's request to go back 100 years and use hardness in place of this modern evidence is absurd. Again, Applicant requests that the Committee look past outdated quantum theory and consider Applicant's state-of-the-art data.

On page 8 of Souw Appendix A, the Committee further incorrectly states:

> Specifically regarding Sections 35-36, Applicant's recitation of elements other than helium does not remove Applicant's error of misidentifying the He-II line as being of hydrino origin.

Contrary to the Committee's misstatement, Applicant has not misidentified the He II line and has provided a detailed analysis that conclusively ruled out He II. As stated previously, "conspicuously absent was the 256 A (48.3 ev) line of He II shown in Figures 6 and 8 which implies only a minor He II transition contribution to the 304 A peak," to which the Committee provides no response. The Committee's mere conclusory statements pale in comparison to the experimental evidence of record.

On page 8 of Souw Appendix A, the Committee further incorrectly states:

> Specifically regarding Section 39, the Examiner has never recited that an impurity is an oxidation state, as claimed by Applicant on page 33.

In Section 39, the Committee notably ignores Applicant's arguments demonstrating that impurities were absolutely ruled out by ion sputtering. The Committee has failed to rebut this essential point that no impurities were present.

On page 8 of Souw Appendix A, the Committee further incorrectly states:

> Specifically regarding Section 40, the previous Appendix clearly identifies lines 1-2 below Fig.29 in Marchese's Final Report, which recites, word for

> word, *"As shown in Fig. 29b, the measured C* values are on the same order as those measured for chemical rocket propulsion, which is reasonable for the first proof of concept test."* **In his** 05/23/2005 Response/Appendix, Applicant has cited a different text that is nowhere to be found in Marchese's original Final Report.

As stated previously, Applicant cited from pages 25-30 of Marchese's Final Report, the very same report cited by the Committee.

On page 8 of Souw Appendix A, the Committee further incorrectly states:

> Nevertheless, Applicant's recitation does not even support Applicant's claim of "excessive heat", but only increased heat (point V on page 26).

From reading Marchese, excess heat due to formation of lower-energy hydrogen is clearly demonstrated, and the Committee has not shown otherwise.

On page 9 of Souw Appendix A, the Committee further incorrectly states:

> (15) In section 38, Applicant's claim of hydrino hydride's hardness is the only nebulous hardness throughout this prosecution, since the corresponding hardness of all other hydrides are known in hard numbers. As such, Applicant's argument of nebulous hardness of a substance is irrelevant.

Once again, the Committee's arguments regarding hardness are nonsensical. As stated previously and ignored by the Committee, XPS spectroscopy is a far more accurate method of measuring the bond energy. Applicant does not understand why the Committee is requiring Applicant to use a 100-year-old outdated method of testing hardness to determine bond energies instead of the state-of-the-art XPS method. Applicant requests that the Committee look past outdated quantum theory and give full consideration to the XPS experimental evidence of record.

On page 9 of Souw Appendix A, the Committee further incorrectly argues:

> (16) In section 41, Applicant argues that his results were reproduced by EarthTech and Marchese. The Examiner strongly disagrees for reasons stated in the previous Appendix. The facts in the record clearly support the Examiner's position when one refers to the Earth Tech and Marchese reports.

Earth Tech, a competitor, and Marchese have been fully addressed and no further statement is warranted. The Committee's failure to adequately rebut these

points is glaring.

On page 9 of Souw Appendix A, the Committee further incorrectly states:

(17) Sections 42-51 recite various arguments regarding Doppler broadening:

Specifically regarding Sections 44-49, in contradiction to Applicant's claim of alleged support of Applicant's hydrino (or GUT/CQM) theory, the 2005 paper by Cvetanovic at al. (also Jovicevic et al. 2004) is totally silent about hydrino, fractional hydrogen energy levels, and/or GUT/CQM, while unambiguously ***disproving*** Applicant's RTM model, as recited on page 033302-2 col. l/2~1~~ full paragraph and on pg.033302~7,col.2/ls[t] full paragraph, and ***refuting*** Applicant's RTM model in ***at least 5 conspicuous points***.

Cvetanovic has already been fully addressed by Applicant, without an adequate response from the Committee. As previously stated, Applicant finds the Committee's views on this article extremely troubling, though hardly surprising, since it appears to be a thinly veiled hatchet-job intended to discredit Applicant. Cvetanovic et. al. propose that the energy required to selectively heat atomic hydrogen to extraordinary temperatures comes from the field acceleration of ionic species. The paper **J. Phillips, C-K Chen, R. Mills, "Evidence of catalytic Production of Hot Hydrogen in RF Generated Hydrogen/Argon Plasmas", IEEE Transactions on Plasma Science, submitted** demonstrates that no model of that type is viable. Broadening existed throughout the plasma, and not only in the region of high fields. In fact, it was found that the nature of the broadening does not correlate to field strength whatsoever. All predictions that orientation of the observer relative to the field will impact the nature of the observed broadening were disproved. For example, observation parallel to the field should yield broad lines that are red or blue shifted, and not symmetric, as a function of the orientation of the observer relative to the cathode. The results were always symmetrical. Also, there is every reason to suggest that the magnitude of the broadening observed perpendicular to the direction of the field should be less than that parallel to the field. It was independent of the viewing direction. Philips et al. provide a data set, remarkably thorough relative to that of previously published work, that shows the shape of the Balmer lines perpendicular to the field, parallel to the field and in

regions with no field are remarkably similar under many conditions. This data also makes all forms of the "field acceleration" models of broadening untenable.

The Cvetanovic article contains some data consistent with the statements made above. For example, in Figure 4 of that article there is data that shows that the broadening of the Ha peak is independent of the orientation of observation relative to the field direction.

Unfortunately, although the data agrees with that collected and reported by Philips et al., the text of the article contains some clear misrepresentations. Specifically, the data regarding the fit of Figure 4c (but notably not that of Figures 4a and 4b) is missing. It also appears to the careful reader that Fig. 4c was printed in a larger format than Figures 4a and 4b, and hence gives the appearance to the casual reader that the broadening in Figure 4c is larger than that of figures 4a and 4b. In fact, the broadening of Figure 4c is virtually identical to that measured for Figures 4a and 4b.

Perhaps the authors of the aforementioned paper did not want readers to have direct access to the data? Indeed, the data contradicts statements made in the Abstract:

> Large excessive Balmer alpha line broadening in pure hydrogen and its dependence upon the direction of observation with respect to the electric field is in contradiction to the resonance transfer model, proposed by Mills et al. in several publications (see, e.g., IEEE Trans. Plasma Sci. 31, 338 2003.)

Putting such a statement in the Abstract is a clear indication of the intent of the authors, i.e. to disprove the RT model despite the data to the contrary. Indeed, since the data they present shows that there is no dependence of line broadening upon the direction of observation with respect to the electric fields, the above statement in the abstract is false. The attack on Applicant's paper thus has the appearance of malice.

The sense of malicious mischief is increased because of additional directly false statements, such as this one from the conclusions:

> The presence of large excessive Ha line broadening in pure hydrogen and several experimental results, such as the importance of the direction of observation with respect to the electric field and exponential decay of excessive broadened Balmer line intensity in the negative glow, are in contradiction

to the resonance transfer model.5,6

Not only is the data contained in the paper in direct contradiction to the statement regarding "direction of observation", there is in fact not a shred of data presented that refutes any of the predictions of CQM. It is unfortunate that these statements were even published, but then to be touted by the Committee is outrageous.

On page 9 of Souw Appendix A, the Committee further incorrectly states:

> All those reference papers cited on pg. 57 merely confirm excessive broadening in hydrogen lines, the latter remaining a well known phenomenon for many decades, even observed by the Examiner himself as far back in 1985 in relation with his work performed at the Air Force Wright Aeronautical Laboratories reported in ref 10 of Part II of the previous Appendix.

Applicant notes that the Committee does not provide an explanation for the excessive broadening. That is because, prior to Applicant's modern theory, outdated quantum theory provided the wrong explanation, i.e., that the excessive broadening is only due to field acceleration. Applicant's modern theory was the first to show that excessive broadening is due to lower-energy hydrogen formation under the right conditions. Applicant spent many millions of dollars to provide published experimental evidence showing that certain excessive broadening is the result of lower-energy hydrogen production, which the Committee has not refuted, only ignored.

On pages 9-10 of Souw Appendix A, the Committee further incorrectly states:

> As already explained, in order to be correct, a theory must be logically and mathematically flawless and free of contradiction. In order to be true, a theory must be <u>firstly</u> correct, and further, verified by experimental observation. Applicant's GUT/CQM is mathematically flawed and full of contradiction. Its alleged "experimental evidence" is only argued by Applicant, but never self-evident, or, it is even contradicted by the scientific community, such as by Cvetanovic at al.

Applicant's modern theory is "firstly correct" in that it predicted the existence of lower energy states of hydrogen, which were later confirmed experimentally. In contrast, outdated quantum theory has been shown to be seriously flawed and anything but logical, which explains why it specifically excludes these now experimentally proven

lower energy states. Applicant's modern theory is based on classical laws and is mathematically sound. In contrast, outdated quantum theory violates classical laws and is mathematically flawed.

The Cvetanovic reference has been shown to be wrong by Applicant, which stands unrefuted by the Committee. Applicant suggests that the Committee fairly consider the experimental evidence of record instead of fabricating baseless conclusions regarding non-existent flaws or contradictions.

On pages 10-15 of Souw Appendix A, the Committee further incorrectly states:

> Specifically regarding Section 50, Doppler-free laser spectroscopy recommended by the Examiner is insofar important, as it would ultimately clarify the longstanding puzzle regarding the origin of excessive broadening in hydrogen lines. It is unscientific to make an unsupported statement that the Doppler-free laser spectroscopic line width would be negligible in comparison to the observed broadening, since such measurement has never been actually made in the entire history of hydrogen line broadening anomaly. If and only if it turns out that the Doppler-free (i.e., homogenous) line width is within the conventionally known natural line width can one conclusively conclude that the observed broadening is inhomogeneous (Doppler). However, it may well turn out that the Doppler-free line width is effectively as broad as the observed line width, e.g., in the form of plasma satellites or microwave satellites (Blochinzew effect).
>
> Generally regarding Sections 42-51, Applicant has clearly misunderstood the diverse units conventionally used to represent line broadening data, as well as their interpretation in light of homogeneous broadening (such as, natural line width or oscillation damping, broadening due to electron impact, static ion field, microwave effects), as opposed to inhomogeneous broadening (such as translational energy spread due to the Doppler shift). It is conventional to express line width measurement data in equivalent units of [cm'], [Hz], and/or [nm]. These units are all equivalent and can be easily converted from one to another by one of ordinary skill in the art. The corresponding conversion formulas have been previously given in the previous Appendix on page 9-10. These formulas may be verified with the cited references (ref [9],[IOJ cited in Part I of the previous Appendix) as well as with any textbook or scientific publication in plasma spectroscopy, such as, e.g., Conversion Table cgs/SI-Units ([online]. [retrieved on *2005-09-16].* Retrieved from the Internet: CURL: www.plasmaphysics.org.uk/convers.htm>) regarding the conversion formulas and the units, and Equation 31 of a paper by S. Johansson and S. Letokhov in Astronomy & Astrophysics 378 (2001) pp. 266-278, regarding the Doppler shift/broadening formula. Thus, according to this

general knowledge in the art, Luggenholscher's line width of $\delta\lambda$ =1.6 nm is equivalent to $\delta\lambda$ = 3.7 cm-1 (with σ=l/λ) or δv=111 GHz, and Applicant's $\delta\lambda$ = 10.0 cm-1 or δv=188 Ghz (using the basic formula $\delta v=c\delta\sigma$, which is the same as, and hence, giving exactly the same result as $\delta v/v = \delta\lambda/\lambda$).

While the conversion wave number δ = 1/λ [cm-1] and oscillation frequency v [Hz] into energy units [eV] is straightforward, conversion of the corresponding line ***widths*** ***δc*** and δv into energy units [eV] is not possible without considering the homogenous and inhomogenous contributions to the line broadening, i.e., either as damping energy of the oscillating ***electron,*** or as translational or kinetic energy of the moving ***atom,*** the latter involving the atomic or nuclear mass). Presuming that homogeneous line width is predominant and the inhomogeneous contribution is negligible, Luggenholscher' s $\delta\lambda$=0. 16 nm (homogeneous) line width is equivalent to an electron oscillation energy spread of δE_{hom} = 0.45 meV ***(NOT*** 4.5 meV, as calculated by Applicant and recited on pages 45 and 57), and Applicant's $\delta\lambda$=0.27 nm (homogeneous) line width is equivalent to δE_{hom} = 0.76 meV (i.e., using the basic formula E_{hom} = hv and $\delta E_{hom} = h\delta v$). However, assuming the line broadening is predominantly Doppler, the same line width converts to an atomic translational/kinetic energy by virtue of the Doppler formula given on page 10 of the previous Appendix, to give $E_{doppler} \approx$ 15 eV for Luggenholscher's data, and $E_{doppler} \approx (0.27/0.16)^2$ x 15 eV =43 eV for Applicant's data. The intermediate case where the contributions of homogeneous and inhomogeneous broadenings are both not negligible is well known in the art, but here not discussed, since it would not help clarify Applicant's present misunderstanding of converting line widths to different units.

Applicant's comment in Section 48 on page 57 is scientifically unsound: (a) The fact that the Examiner does not use the same conversion formula as Cvetanovic's (2005) does not at all mean that the Examiner's method and results are incorrect. Applicant's allegation is incorrect, insofar as the Examiner's method conforms with the conventional method generally known in the art (ref [9],[l0] cited in Part I of the previous Appendix, and new references, Conversion Table cgs/SI-Units ([online]. [retrieved on 2005-09-16]. Retrieved from the Internet: CIJ~Jj www.plasmaphysics.org.uk/convers.htm>) and S. Johansson and S. Letokhov in Astronomy & Astrophysics 378 (2001) pp. 266-278, cited above).

(b) the Examiner's calculation is based on Luggenholscher's as well as Applicant's experimental data, but not at all on Cvetanovic's, so there can be no requirement for the Examiner to conform with Cvetanovic' s method (which is known in the art to differ by a factor less than one order of magnitude due to Cvetanovic's use of highly directed atomic beam, as

opposed to assuming a random distribution of atomic velocities) . . .

(c) despite the differences (in his analysis/formula Cvetanovic et al. includes collisional effects in a highly directed atomic beam), the Examiner's result is also consistent with Cvetanovic's, as demonstrated in Table 1 below.

To help Applicant clarify his misunderstanding of elementary plasma spectroscopy, and to clearly elucidate the significant difference between electron oscillation damping energy in case of homogeneous broadening and atomic kinetic or translational energy in case of inhomogeneous Doppler broadening, the Examiner will make use of his past experience as Professor in Applied Physics at a reputable US university (please refer to his short biography in the 2003 SPIE article already known/cited by Applicant) and give the following detailed example.

An atom with oscillating electron that radiates is here made equivalent to a jet fighter that radiates communication electromagnetic waves at 1 0Hz in all directions. The typical mass of a jet fighter (e.g. F-l6) is roughly 10,000 kg, or l0~ gm. Assuming a homogeneous radiation line width (as determined by the Q-value of the oscillator circuit) of 1 kHz, we thus have a homogenous line width ratio of $Sv/v=10^6$. Assuming this homogeneous line width is due to oscillator damping (i.e., the so-called natural line width), the corresponding oscillator energy spread is 6Ehcm=h~SV=4~ 1012 eV. On the other hand, assuming the same line width is predominantly due to Doppler shift (which becomes an isotropic broadening in case of a large number of radiating jet fighters randomly flying in all directions, equivalent to a random velocity distribution of radiating atoms) the same amount of line width $Sv/v10^6$ corresponds to a velocity of $V/c= Sv/v10^6$, i.e., a (mean) aircraft velocity of V300 ni's, which is a plausible subsonic velocity. The Doppler or kinetic/translational energy is $EDoppler=0.5\sim m\sim V^2$ = 3000 eV. We thus see, although the oscillation energy spread is even smaller than 0.001 eV, the corresponding kinetic energy of the entire radiator (equivalent to the atomic translational energy) is even larger than 100 eV.

For ultimate comparison, the various equivalent units for expressing the experimental data of Luggenholscher, Applicant, Cvetanovic et al. and the jet fighter are shown in Table I below. The numerical values for Cvetanovic's data are taken from Fig.5 that represents cases with negligible homogeneous broadening and calculated according to the undergraduate scaling formula: $EDQPP1el. -\sim (OX)^2$, which can be verified using Cvetanovic's own data, $83\ eV(0.46/0.40)^{2\sim}62$ eV (QED), further showing consistency with Luggenholscher's data, ED~,1er=(3/2)~(0. 16/0.46)2.83=15 eV, and also with Applicant's data, $E\sim_{0\sim\sim1}e(3/2)\sim$ (0.27/0.46)2.83=43 eV, wherein the factor 3/2 is introduced

to reconcile Cvetanovic's case-specific result referring to a highly directed velocity distribution with the random velocity distribution assumed in a conventional Doppler broadening case (see formula on page 10 of the previous Appendix). Table 1 demonstrates a general consistency of the numerical results.
[TABLE 1 Excluded]

Note: to save time, the Examiner performed only back-of-the-envelope calculations. Therefore, the above tabulated numerical values are accurate within 10%. This accuracy is by far more than enough to refute Applicant's scientifically incorrect allegation that the Examiner's line broadening numbers were wrong by SIX ORDERS OF MAGNITUDE in H energy (Sect. 44 on page 45). Especially Applicant's consecutive wording ***"in H** energy"* is in grave error, because the oscillator energy spread in [meV] is purely determined by the energy of the oscillating ***electron*** and its damping/Q-value, and does not involve the ***atomic mass of hydrogen,*** and hence, has nothing to do with *"H energy",* the latter only making sense in case of Doppler broadening (15 eV).

With the above comparisons, the Applicant's repeated allegations in his responses that the Examiner's line broadening numbers were wrong by SIX ORDERS OF MAGNITUDE has no basis.

These statements conclusively show that the Committee, led by BMS President Souw, is incapable of fairly evaluating Applicant's technology. Dr. Souw is clearly mistaken regarding the kinetic energy of a 10,000 kg jet fighter having a velocity of 300 m/s. The kinetic energy is $\frac{1}{2}mv^2 = \frac{1}{2}(10{,}000\ kg)(300\ m/s)^2 = 4.5X10^8\ J = 2.8X10^{27}\ eV$, **not** 3000 eV as he alleges! This gross miscalculation brings into question Dr. Souw's ability to act as an unbiased Examiner, and most certainly his qualifications to be a "Professor in Applied Physics." This error further demonstrates the extreme lengths to which the Committee will go to avoid fairly considering Applicant's experimental evidence of record.

The Committee is equally off base in his analysis of the Luggenholscher paper. The formula to calculate the Doppler energy from the line width is given in the following articles:

1. M. Kuraica, N. Konjevic, "Line shapes of atomic hydrogen in a plane-cathode abnormal

glow discharge", Physical Review A, Volume 46, No. 7, October (1992), pp. 4429-4432.
2. M. Kuraica, N. Konjevic, M. Platisa and D. Pantelic, *Spectrochimica Acta* Vol. 47, 1173 (1992).
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D. Measurement of the average hydrogen atom temperature and number density from Balmer α line broadening and intensity

The Doppler-broadened line shape for atomic hydrogen has been studied on many sources such as hollow cathode [8, 9] and RF [10-12] discharges. We employed the method of Videnovic et al. [8] and also originally after Griem [21] to calculate the energetic hydrogen atom energies and H densities from the width and intensities of the 656.3 nm Balmer α line emitted from glow discharge and microwave plasmas. The full half-width $\Delta\lambda_G$ of each Gaussian results from the Doppler ($\Delta\lambda_D$) and instrumental ($\Delta\lambda_I$) half-widths:

$$\Delta\lambda_G = \sqrt{\Delta\lambda_D^2 + \Delta\lambda_I^2}\,. \qquad (1)$$

The instrument half-width, $\Delta\lambda_I$ in our experiments was $0.006\ nm$. The temperature was calculated from the Doppler half-width using the formula:

$$\Delta\lambda_D = 7.16\,X\,10^{-7}\lambda_0\left(\frac{T}{\mu}\right)^{1/2} \quad (nm) \qquad (2)$$

where λ_0 is the line wavelength in nm, T is the temperature in K ($1\ eV = 11{,}605\ K$), and μ is the molecular weight (=1 for hydrogen). In each case, the average Doppler half-width that was not appreciably changed with pressure varied by $\pm 5\%$ corresponding to an error in the energy of $\pm 10\%$.

We observe Doppler line broadening of the order of 0.1 to greater than 0.5 nm corresponding to 10's to over 100 eV of H atom kinetic energy. This extraordinary line broadening is observed on all of the H lines that can be recorded. External Stark broadening or acceleration of charged species due to high fields can not explain the microwave results since no high field was present, and the electron density was orders of magnitude too low for the corresponding Stark effect. Rather, a resonant energy transfer mechanism is proposed.

Further from

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No high electric field was present in the microwave plasmas. Thus, the results can not be explained by external Stark broadening or acceleration of charged species due to high fields

of over $10\ kV/cm$ as proposed by Videnovic et al. [8] to explain excessive broadening observed in glow discharges. The electron Stark effect and other possibilities were also eliminated as discussed in Sec. IIIC.

C. Balmer α line broadening and T_e measurement recorded on microwave discharge plasmas

The 656.3 nm Balmer α line width recorded with a high resolution ($\pm 0.025\ nm$) visible spectrometer on microwave discharge plasmas of hydrogen compared with each of xenon-hydrogen (90/10%), magnesium-hydrogen, and helium-hydrogen (90/10%) are shown in Figures 8-10, respectively. The statistical curve fit of the hydrogen plasma and the argon-hydrogen plasma emission are shown in Figures 11 and 12, respectively. In each case, the data matched a Gaussian profile having the X^2 and R^2 values given in Figures 11 and 12. The energetic hydrogen atom energies and H densities of plasmas of hydrogen alone, strontium or magnesium with hydrogen, and noble gas-hydrogen mixtures were calculated using the method of Videnovic et al. [8] and are given in Table II. It was found that the strontium-hydrogen microwave plasma showed a broadening similar to that observed in the glow discharge cell of $27-33\ eV$; whereas, in both sources, no broadening was observed for magnesium-hydrogen. Furthermore, the microwave helium-hydrogen and argon-hydrogen plasmas showed extraordinary broadening corresponding to an average hydrogen atom temperature of $180-210\ eV$ and $110-130\ eV$, respectively, and an atom density of $4.8\ X10^{14} \pm 20\%\ atoms/cm^3$ and $3.5\ X10^{14} \pm 20\%\ atoms/cm^3$, respectively. In contrast, pure hydrogen, neon-hydrogen, krypton-hydrogen, and xenon-hydrogen showed no excessive broadening corresponding to an average hydrogen atom temperature of $\approx 4\ eV$ and an atom density of only $7\ X10^{13} \pm 20\%\ atoms/cm^3$. The pure hydrogen result was particularly significant given that less atomic hydrogen existed compared to hydrogen mixed with helium or argon even though 10 times more hydrogen was present for the pure hydrogen plasma. Furthermore, only the hydrogen lines were broadened. The addition of hydrogen to helium or argon had no effect on the helium or argon lines as shown for the 667.816 nm He I and 696.48 nm Ar I lines in Figures 13 and 14, respectively.

Excessive line broadening was only observed in the cases where an ion was present which could provide a net enthalpy of reaction of an integer multiple of the potential energy of atomic hydrogen (Sr, Sr^+, Ar^+, or He^+). Whereas, excess line broadening was not observed for plasmas of chemically similar controls that do not provide gaseous atoms or ions that have electron ionization energies which are a multiple of $27.2\ eV$ (atoms or ions of

Mg, Ne, Kr, and Xe; the potential for a 40.8 eV reaction of Ne^{+} to Ne^{2+} is discussed elsewhere [26]). The broadening observed for the first time in $He-H_2$ and $Sr-H_2$ plasmas was predicted. The absence of broadening in the control plasmas was predicted as well. Thus, results these support the rt-plasma mechanism.

The results of the T_e measurements on microwave plasmas of pure hydrogen alone, strontium or magnesium with hydrogen, and a mixture of 10% hydrogen and helium, neon, argon, krypton, or xenon are given in Table II. Similarly to the fast H measurement, the average electron temperature for helium-hydrogen plasma was $30,500 \pm 5\%\ K$; whereas, the corresponding temperature of helium alone was only $7400 \pm 5\%\ K$. The average electron temperature for argon-hydrogen plasma was $13,700 \pm 5\%\ K$; whereas, the corresponding temperature of argon alone was only $5700 \pm 5\%\ K$.

Boivin et al. [24] have measured the electron temperature in helium plasmas under conditions similar to ours. At these low temperatures and low to moderate densities ($n_e < 10^{13}\ cm^{-3}$), several secondary processes such as volume recombination and the effect of collisions between excited and ground atoms are negligible. In addition, plasmas are generally optically thin when electron densities are low ($n_e < 10^{10}\ cm^{-3}$), but are increasingly opaque as the density increases. Typically, the plasma is opaque to resonance lines (transitions involving the ground state) and for transitions ending on metastable levels, but remain optically thin for transitions between excited levels even at moderately high density ($\geq 10^{14}\ cm^{-3}$). In our studies, transitions between levels were selected to ensure that the plasmas were optically thin. The electron temperatures were also measured with a Langmuir probe. The good agreement between the optically measured and Langmuir probe measured electron temperatures indicated that the plasma were optically thin and the steady state coronal model was appropriate for the spectroscopic determination of the electron temperatures.

The hydrogen atom temperature in plasmas of hydrogen mixed with argon or helium were about 50-100 times that observed for the control plasmas such as hydrogen mixed with xenon or hydrogen alone. Even so, the observed $\approx 4\ eV$ temperature of the latter plasmas was still well above the resolution capability of the instrument, and surprisingly it was appreciably above that expected based on the electron temperature of 1-2 eV. The observation of an elevated hydrogen atom temperature for pure hydrogen plasmas and mixtures containing hydrogen with the unusual absence of an elevated temperature of any other gas present has been observed before. For example, using a GEC RF cell Radovanov et al. [12] observed that the structure of the H_α line emission from a pure H_2 discharge showed a slow component with an average energy of 0.2 eV and a broadened component of

8.0 eV. Very high energies have been observed. Hydrogen line broadening corresponding to 123 eV has been observed with hydrogen plasmas maintained in a GEC RF cell [11]. Extraordinary line broadening near the cathode corresponding to fast H with >300 eV is only observed in the cases of discharges of hydrogen or in hydrogen mixtures. This phenomenon is not observed in discharges of pure noble gases [8, 11, 27-30]. In the case of the production of fast H, the intensity may be low due to efficient collisional energy exchange with molecular hydrogen with dissociative excitation [31]. In a glow discharge fast H is formed and excited predominantly near the electrode surfaces. The emission from fast H formed at the cathode is also not expected to extend significantly into the bulk of an H_2 discharge because of quenching of H($n = 3$) by collisions with H_2 [12]. Again, this unusual effect was attributed to electric field acceleration of positive hydrogen ions in the cathode fall region.

In our microwave hydrogen plasma, no such field exists. But, the potential for an rt-plasmas does. Since the ionization energy of hydrogen is 13.6 eV, two hydrogen atoms can provide a net enthalpy equal to the potential energy of the hydrogen atom, 27.2 eV—the necessary resonance energy, for a third hydrogen atom. On this basis, the unusual observation of the H energy slightly above the electron temperature is expected. The effect is expected to more pronounced with greater hydrogen concentration such as that achieved near or on the cathode in RF and glow discharge cells.

We have assumed that Doppler broadening due to thermal motion was the dominant source to the extent that other sources may be neglected. To confirm this assumption, each source is now considered. In general, the experimental profile is a convolution of two Doppler profiles, an instrumental profile, the natural (lifetime) profile, Stark profiles, van der Waals profiles, a resonance profile, and fine structure. The instrumental half-width is measured to be $\pm 0.006\ nm$. The natural half-width of the Balmer α line given by Djurovic and Roberts [10] is $1.4\ X\ 10^{-4}\ nm$ which is negligible. The fine structure splitting is also negligible.

Stark broadening of hydrogen lines in plasmas can not be measured at low electron densities using conventional emission or absorption spectroscopy because it is hidden by Doppler broadening. In the case of the Lyman α line, the Stark width exceeds the Doppler width only at $n_e > 10^{17}\ cm^{-3}$ for temperatures of about $10^4\ K$ [32]. Gigosos and Cardenoso [33] give the observed Balmer α Stark broadening for plasmas of hydrogen with helium or argon as a function of the electron temperature and density. For example, the Stark broadening of the Balmer α line recorded on a $H + He^+$ plasma is only 0.033 nm with $T_e = 20{,}000\ K$ and $n_e = 1.4\ X\ 10^{14}\ cm^{-3}$.

The relationship between the Stark broadening $\Delta\lambda_S$ of the Balmer β line in nm, the

electron density n_e in m^{-3}, and the electron temperature T_e in K is

$$\log n_e = C_0 + C_1 \log(\Delta\lambda_S) + C_2[\log(\Delta\lambda_S)]^2 + C_3 \log(T_e) \quad (5)$$

where $C_0 = 22.578$, $C_1 = 1.478$, $C_2 = -0.144$, and $C_3 = 0.1265$ [34]. From Eq. (5), to get a Stark broadening of only 0.1 nm with $T_e = 9000\ K$, an electron density of about $n_e \sim 3\ X10^{15}\ cm^{-3}$ is required, compared to that of the argon-hydrogen plasma of about $10^8\ cm^{-3}$ determined using a compensated Langmuir probe, over seven orders of magnitude less. Regional maxima in electron densities that could give rise to Stark broadening was eliminated as a possibility. The measured electron densities did not exceed $10^9\ cm^{-3}$, and the axial variation was weak, showing less than a factor of two change throughout the brightest region of the plasma. The high mass diffusivity of all of the species present made it unlikely that a large density gradient existed anywhere in the plasma at steady state. This result was also evident by the good fit to a Gaussian profile recorded on the argon-hydrogen plasma rather than a Voigt profile as shown in Figure 12. In addition, the line broadening for Balmer β, γ, and δ was comparable to that of Balmer α; whereas, an absence of broadening beyond the instrument width was observed for the lines of argon or helium species such as the 667.73 nm and 591.2 nm Ar I lines and 667.816 nm and 587.56 nm He I lines. Thus, the Stark broadening was also insignificant.

A linear Stark effect arises from an applied electric field that splits the energy level with principal quantum number n into $(2n-1)$ equidistant sublevels. The magnitude of this effect given by Videnovic et al. [8] is about $2\ X10^{-2}\ nm/kV \cdot cm^{-1}$. No applied electric field was present in our study; thus, the linear Stark effect should be negligible. The absence of broadening of the noble gas lines and the hydrogen lines of the controls confirms the absence of a strong electric field.

To investigate whether the rt-plasmas of this study were optically thin or thick at a given frequency ω, the effective path length $\tau_\omega(L)$ was calculated from

$$\tau_\omega(L) = \kappa_\omega L \quad (6)$$

where L is the path length and κ_ω is the absorption coefficient given by

$$\kappa_\omega = \sigma_\omega N_H \quad (7)$$

where σ_ω is the absorption cross section and N_H is the number density of the absorber. For optically thin plasmas $\tau_\omega(L) < 1$, and for optically thick plasmas $\tau_\omega(L) > 1$. The absorption cross section for Balmer α emission is $\sigma = 1\ X10^{-16}\ cm^2$ [35]. By methods discussed previously [36-37], an estimate of the $n = 2$ H atom density based on Lyman line intensity is $\sim 1\ X10^8\ cm^{-3}$. Thus, for a plasma length of $5\ cm$, $\tau_\omega(5\ cm)$ for Balmer α is

$$\tau_\omega(5\ cm) = \kappa_\omega L = (1\ X10^{-16}\ cm^2)(1\ X10^8\ cm^{-3})(5\ cm) = 5\ X10^{-8}. \quad (8)$$

Since $\tau_\omega(5) <<< 1$, the argon-hydrogen plasmas were optically thin; so, the self absorption of

656.3 nm emission by $n = 2$ state atomic hydrogen may be neglected as a source of the observed broadening.

As discussed above, an estimate based on emission line profiles places the total H atom density of the argon-hydrogen plasma at $\sim 3.5\,X10^{14}\ cm^{-3}$. Since this is overwhelmingly dominated by the ground state, $N_H = 3.5\ X10^{14}\ cm^{-3}$ will be used. Usually, the atomic hydrogen collisional cross section in plasmas is on the order of $10^{-18}\ cm^2$ [38]. Thus, for $N_H = 3.5\ X10^{14}\ cm^{-3}$, collisional or pressure broadening is negligible.

A number of mechanisms have been proposed in order to explain the excessive Doppler broadening of the Balmer α line in argon-hydrogen DC or RF driven glow discharge plasmas. Many of these have subsequently been shown to be untenable based on additional data or based on our results with microwave plasmas where no applied field is present. For example, Konjevic and Kuraica [7] observed $50\ eV$ anomalous thermal broadening of the Balmer lines during plane-cathode abnormal glow discharges of hydrogen-argon mixtures which was not observed with neon-hydrogen mixtures or pure hydrogen irrespective of cathode material, copper, carbon, or silver. To explain the excessive broadening with the presence of argon, they have proposed the quasiresonant charge-transfer process

$$Ar^{+(m)} + H_2 \rightarrow Ar + H_2^+ \qquad (9)$$

with the further reaction

$$H_2^+ + H_2 \rightarrow H_3^+ + H \qquad (10)$$

occurring to a significant extent due to its large cross section. The authors state:

> "However, in either case, it is essential that the H_2^+ or H_3^+ ion must gain energy in the electric field of the discharge before dissociation. Otherwise, the large energy of excited hydrogen atoms (on the average 50 eV per atom) cannot be explained."

In our experiments, the 110-130 eV line broadening observed in an argon-hydrogen microwave plasma can not be explained by this mechanism since no external field was present. In addition, broadening in argon-hydrogen plasmas can not be explained purely by a resonance energy transfer to H_2^+ which is accelerated in the electric field to dissociate as energetic atomic hydrogen as proposed by Kuraica and Konjevic [7]. Since the electric field is conservative, the symmetry of the broadened profile can not be explained simply by the acceleration of H_2^+ or any positive ion towards the cathode. This mechanism could only account for the red portion of the profile with the line of sight towards the cathode. A mechanism for the production of the blue portion that is symmetrical with the red portion is

required. Such a mechanism was not suggested.

Djurovic and Roberts [10] recorded the spectral and spatial profiles of Balmer α line emission from low pressure RF (13.56 MHz) discharges in $H_2 + Ar$ mixtures in a direction normal to the electric field. The introduction of Ar in a pure H_2 plasma increased the number of fast neutral atoms as evidenced by the intensity of the broad component of a two-component Doppler-broadened Balmer α line profile. Independent of cell position or direction, the average temperature of a wide profile component was 23.8 eV for voltages above 100 V, and the average temperature of a slow component was 0.22 eV. The mechanism proposed by Djurovic and Roberts is the production of fast H atoms from electric field accelerated H_2^+. The explanation of the role of Ar in the production of a large number of excited hydrogen atoms in the $n = 3$ state, as well as raising their temperature for a given pressure and applied RF voltage, is that collisions with Ar in the plasma sheath region enhances the production of fast H_2 from accelerated H_2^+. The fast H_2 then undergoes dissociation to form fast H which may then be excited locally to the $n = 3$ state by a further collision with Ar. The local excitation is a requirement since the atomic lifetime of the hydrogen $n = 3$ state is approximately 10^{-8} s, and the average velocity of the hydrogen atoms is $< 10^5$ m/s. Thus, the distance traveled must be less that 0.001 m.

The experimental evidence from several sources including ours does not support this mechanism. 1.) Only the number, but not the average energy (23.8 eV), of fast H-excited atoms was observed to be dependent of the position between the electrodes and the pressure for the same peak-to peak voltage (200 V). For a mechanism based on acceleration of any charged species in a special region such as the cathode fall region, this is unexpected. 2.) Since the measurements were taken perpendicular to the applied electric field, the symmetrical Doppler shape of both components centered at the same wavelength indicated that there were no directional velocity effects from the applied electric field. This would not be expected since the red and blue parts of the wings due to fast H must come from at least two different mechanisms. The red wing due to fast atoms moving toward the powered electrode arise from accelerated H_2^+; whereas, those moving away from the electrode arise from back scattered fast H atoms or fast H atoms formed on the electrode from decomposition of fast H_2^+ or fast H_2. Momentum transfer must occur at the electrode and gaps and/or asymmetries in the intensity would be expected for the proposed mechanism. A Maxwellian distribution would not be anticipated from these different mechanisms; thus, a Gaussian line shape would not be anticipated. Rather a single source of fast H formed independent of direction is needed. 3.) Radovanov et al. [11] studied the excited neutrals and fast ions produced in a 13.56 MHz radio-frequency discharge in a 90%

argon-10% hydrogen gas mixture by spatially and temporally resolved optical emission spectroscopy and by mass-resolved measurements of ion kinetic energy distributions at the grounded electrode. They concluded that a significant contribution of fast H atoms from H_2^+ is unlikely, due to the very fast conversion of H_2^+ to H_3^+. They determined that H_3^+ was the dominant light ion with H^+ and H_2^+ having intensities more than an order of magnitude lower. In addition, H_3^+ had the highest mean energy of the ions, even though H^+ exhibited the highest maximum kinetic energies. Based on these results, they concluded that H_3^+ rather than H_2^+ was the primary source of fast H emitted from the surface of the powered electrode. 4.) The Djurovic and Roberts mechanism of the excessive broadening caused by the addition of argon does not explain the lack of an effect with neon as shown by Kuraica and Konjevic [7]. Nor does it explain the lack of an effect with xenon or the greater effect with helium. 5.) All prior mechanisms to explain the excessive Balmer α line broadening in argon-hydrogen plasmas are based on the absolute requirement of an electric field which is absent in our microwave plasma experiments.

Videnovic et al. [8] explain the argon effect as due to the more efficient production of H_3^+. However, the most abundant ion in a pure hydrogen plasma is also H_3^+ [31]. And, according to Bogaerts and Gijbels [39] H_3^+ is the dominant hydrogen ion in argon-hydrogen plasmas due to the rapid reaction of H_2^+ with H_2. Videnovic et al. [8] claim the production of significant amounts of H_3^+ by participation of argon ion through reactions such as

$$Ar^+ + H_2 \rightarrow ArH^+ + H \qquad (11)$$

and

$$ArH^+ + H_2 \rightarrow H_3^+ + Ar\,. \qquad (12)$$

However, Bogaerts and Gijbels [39] show that protonated argon is rapidly reduced by electrons. The reaction

$$ArH^+ + e^- \rightarrow Ar + H \qquad (13)$$

has a high rate constant of $k \sim 10^{-7}\ cm^3 s^{-1}$ [39]; whereas, the formation of ArH^+ is much slower. The rate constant and cross section for proton transfer given by Eq. (11) are $k \sim 4\,X\,10^{-10} - 1.6\,X\,10^{-9}\ cm^3 s^{-1}$ and $\sigma \sim 2\,X\,10^{-15}\ cm^2$, respectively, [39] which are not favorable. Similarly, the rate constant and cross section for charge transfer given by

$$Ar^+ + H_2 \rightarrow Ar + H_2^+ \qquad (14)$$

are $k \sim 2.7\,X\,10^{-10}$ and $\sigma \sim 10^{-15}\ cm^2$, respectively [39]. These reactions are very unlikely to contribute to the production of H_3^+ in an appreciable manner since the degree of ionization of argon is typically low, $10^{-5} - 10^{-4}$ [39]. And, Ar actually contributes to the destruction of H_3^+ through the reaction

$$Ar + H_3^+ \rightarrow ArH^+ + H_2 \qquad (15)$$

which has a significant cross section of $\sigma \sim 5\,X\,10^{-16}\ cm^2$.

In addition, Videnovic et al. [8] propose the argon effect is due to the efficient production of H_3^+ via the production of H_2^+ by the reaction

$$Ar^+\left(3p^5\,^2P_0^{1/2}\right)+H_2 \rightarrow Ar+H_2^+. \qquad (16)$$

The contribution by this pathway is also very unlikely to be significant due to the short lifetime of the excited state and corresponding negligible population.

Since hydrogen usually has a low degree of ionization, 10^{-4}, and the cross section for electron ionization of molecular hydrogen:

$$e^- + H_2 \rightarrow e^- + e^- + H_2^+ \qquad (17)$$

is $10^{-16}\ cm^2$, this reaction is expected to be the major source of H_2^+ even in argon-hydrogen plasmas [39]. The participation by argon should be insignificant when species concentrations, lifetimes, and reaction cross sections are considered. Furthermore, Videnovic et al. ignored other processes which could diminish the acceleration of hydrogen ions in the cathode fall region. For example, the dissociative recombination cross section for H_3^+ given by

$$e^- + H_3^+ \rightarrow H_2 + H \qquad (18)$$

is $10^{-14}\ cm^2$ [39], about an order of magnitude greater than the cross section of Eq. (11) or Eq. (14) which may give rise to H_3^+. Thus, it is not apparent that H_3^+ could give rise to fast H even if it was produced in greater amounts with the addition of argon.

Videnovic et al. [8] propose that the absence of line broadening with argon alone is explained by a large cross section for charge-exchange which prevents the acceleration of argon ions to high energies. For example, the charge-exchange reaction

$$\left(Ar^+\right)_f + Ar_s \rightarrow Ar_f + \left(Ar^+\right)_s \qquad (19)$$

(s designates slow, and f designates fast) has a cross section of the order of $10^{-15}\ cm^2$, in the energy range 10-1000 eV. This cross section is about a factor of 30 times that for charge-exchange processes involving H_3^+ and H^+; thus, Videnovic et al. [8] argue that the diminished collisions result in higher energy ions reaching the cathode in the case of H_3^+ and H^+ compared to Ar^+. But, the cross section for Ar^+ is still very small corresponding to a mean free path at 30 mTorr pressure of about the width of the cathode fall region of 0.1-0.2 cm given by Videnovic et al. [8].

Similarly, their argument that argon gas is more transparent for back scattered fast H atoms than hydrogen gas is not persuasive. They calculate that 66% of reflected H atoms arrive at the negative glow region without collisions in the former case and 18% in the latter case at similar gas pressure and temperature ($T_g(Ar/H_2)=T_g(H_2)=1000\ K$, $P(Ar/H_2)=320\ Pa$, and $P(H_2)=228\ Pa$). However, they assumed a cathode fall region that

was twice the length in the hydrogen case ($L = 0.158\ cm$ versus $0.085\ cm$), and even if this factor of two difference existed, it could be compensated by reducing the hydrogen pressure to one half that of the argon-hydrogen plasma. In fact, intense excessive broadening is not observed in hydrogen with $P(H_2) = 150\ Pa$ [7]; whereas, it is in the case with $P(Ar/H_2) = 320\ Pa$.

Another argument against the greater transparency of argon is that although the intensity is much smaller, excessive broadening is observed at the cathode fall region for hydrogen alone which is greater (125 eV) than that observed in the case of an argon-hydrogen mixture (95 eV) [7].

A further internal inconsistency arises from the explanation of the argon effect by Radovanov et al. [11] compared to that of Videnovic et al. [8]. Radovanov et al. [11] conclude that in the sheath, the Doppler-shifted emission cannot be due primarily to electron collisions with fast H atoms, since calculations show that the electron density on the sheath region should be low. Rather, the emission from the fast H atoms stems from energetic ions or atoms formed near or at the powered electrode, and then are able to travel into the discharge volume before being collisionally excited to the $n = 3$ state. The increase in Doppler-shifted Balmer α emission when argon is added to H_2 is attributed to the high excitation cross section of fast H atoms. Thus, argon provides a collisionless environment according to Videnovic et al. [8] that allow ions to accelerate and fast H to propagate; yet, it is highly collisional according to Radovanov et al. [11] in order to form the excited $n = 3$ atoms. This explanation is even less plausible given our observation with microwave plasmas that the largest broadening was observed with helium-hydrogen followed by argon-hydrogen, but no broadening was observed with neon or xenon with hydrogen.

Videnovic et al. [8] encounter another problem with the observation that the H temperature in the negative glow is higher than that in the cathode fall region. Their explanation is that fast neutrals are additionally excited by collisions with electrons. Yet, the electron temperature T_e in these plasmas is only about 1 eV [7]; whereas, the H atom temperature T_H in the negative glow region was about 50 eV. Since $T_H >>> T_e$ the energetic atoms would be expected to heat the electrons rather than the reverse process as proposed by Videnovic et al. [8].

Prior studies that reported high H temperatures attributed the observation to acceleration of ions in a high electric fields at the cathode fall region [7, 8, 10-12] and an external field Stark effect [8]. We believe this is the first report of similar observations with a microwave plasma having no high field present. The microwave field couples to electrons, not ions. And, the high H temperature can not be attributed to the mechanisms proposed

previously. In fact, the microwave case, the argon atoms and ions would have the highest energies since they have the largest cross section for electron collisions.

No hydrogen species, H^+, H_2^+, H_3^+, H^-, H, or H_2, responds to the microwave field; rather, only the electrons respond. But, the measured electron temperature was about 1 eV; whereas, the measured H temperature was 110-130 eV. This requires that $T_H >>> T_e$. This result can not be explained by electric field acceleration of charged species. In microwave driven plasmas, there is no high electric field in a cathode fall region ($> 1kV/cm$) to accelerate positive ions as proposed previously [7, 8, 10-12] to explain significant broadening in hydrogen containing plasmas driven at a high voltage electrodes. It is impossible for H or any H-containing ion which may give rise to H to have a higher temperature than the electrons in a microwave plasma. The observation of excessive Balmer line broadening in a microwave driven plasma requires a source of energy other than that provided by the electric field.

Excessive line broadening was observed in the case where Ar^+ was present with hydrogen, but not when xenon replaced argon. The distinction is that argon ion may form an rt-plasma. It provides a net positive enthalpy of reaction of $27.2\ eV$ (i.e. it resonantly accepts the nonradiative energy transfer from hydrogen atoms and releases the energy to the surroundings which heat up). The thermalization of the $27.2\ eV$ is consistent with the observation by Djurovic and Roberts [10] and Radovanov et al. [11] of no directional effects of the Doppler broadening due to the applied electric field and the average energy of 23.8 eV and 28 eV, receptively, of the fast H excited atoms that was similar throughput the whole interelectrode region of the discharge over a wide range of gas pressures, applied RF voltages, and hydrogen concentration in $Ar - H_2$ mixtures. In addition, at low pressures, Radovanov et al. [11] observed Ar^+ and ArH^+ kinetic energy distribution profiles with an edge at about $27.2\ eV$. Spectroscopy on these cell such as that given previously [40] and further studies with xenon could confirm the catalysis reaction.

Rt-plasmas formed with hydrogen-potassium mixtures have been reported previously [41-42] wherein the plasma decayed with a two second half-life when the electric field was set to zero. This was the thermal decay time of the filament which dissociated molecular hydrogen to atomic hydrogen. This experiment showed that hydrogen line emission was occurring even though the voltage between the heater wires was set to and measured to be zero and indicated that the emission was due to a reaction of potassium atoms with atomic hydrogen. Potassium atoms ionize at an integer multiple of the potential energy of atomic hydrogen, $m \cdot 27.2\ eV$. The enthalpy of ionization of K to K^{3+} has a net enthalpy of reaction of $81.7426\ eV$, which is equivalent to $m = 3$. K^{3+} and the formation of the corresponding

hydride were detected by EUV spectroscopy recorded on an rt-plasma [43].

A rt-plasma of hydrogen and certain alkali ions formed at low temperatures (e.g. $\approx 10^3\ K$) as recorded via EUV spectroscopy, and an excessive afterglow duration was observed by hydrogen Balmer and alkali line emissions in the visible range [42]. The observed plasma formed from atomic hydrogen generated at a tungsten filament that heated a titanium dissociator and one of potassium, rubidium, cesium, and their carbonates and nitrates. These atoms and ions ionize to provide a net enthalpy of reaction of an integer multiple of the potential energy of atomic hydrogen ($m \cdot 27.2\ eV,\quad m = \text{integer}$) to within 0.17 eV and comprise only a single ionization in the case of a potassium or rubidium ion. Whereas, the chemically similar atoms of sodium and sodium and lithium carbonates and nitrates which do not ionize with these constraints caused no emission. To test the electric dependence of the emission, the weak electric field of about 1 V/cm was set and measured to be zero in $< 0.5\ X\ 10^{-6}$ sec. An afterglow duration of about one to two seconds was recorded in the case of potassium, rubidium, cesium, K_2CO_3, $RbNO_3$, and $CsNO_3$. Hydrogen line or alkali line emission was occurring even though the voltage between the heater wires was set to and measured to be zero. These atoms and ions ionize to provide a net enthalpy of reaction of an integer multiple of the potential energy of atomic hydrogen to within less than the thermal energies at $\approx 10^3\ K$ and comprise only a single ionization in the case of a potassium or rubidium ion. Since the thermal decay time of the filament for dissociation of molecular hydrogen to atomic hydrogen was similar to the rt-plasma afterglow duration, the emission was determined to be due to a reaction of atomic hydrogen with each of the atoms or ions that did not require the presence of an electric field to be functional.

The Committee proposes that presence of high fields can account for the broadening. Videnovic et al. at their Eq. (10) [I. R. Videnovic, N. Konjevic, M. M. Kuraica, "Spectroscopic investigations of a cathode fall region of the Grimm-type glow discharge", Spectrochimica Acta, Part B, Vol. 51, (1996), pp. 1707-1731] give the effect of high fields on the Balmer beta line width as

$$\Delta\lambda_0[nm] = 1.52X10^{-3}E\left[kVcm^{-1}\right] for\ the\ H_\beta\ line \quad (10)$$

Thus, from Eq. (10), fields of kV/cm cannot account for the broadening of up to 1 nm.

Now consider the Luggenholscher paper. By taking the fluorescence line width of the scanned infrared laser as the H Balmer line width and then calculating a Doppler energy based on this assigned width, the Committee clearly demonstrates that it lacks even a basic

knowledge in this technology field. Applicant suggests actually reading the paper for the what the line profile in Fig. 1 of Luggenholscher et al. represents. The method is as follows:

Spectroscopic Method

Neutral hydrogen atoms in the plasma can serve as probes for the local electric field strength. Due to the Stark effect, the energy levels of these atoms are shifted by the electric field. The shift and splitting of the according spectral lines scales with the principal quantum number n like n(n-1). Here, atomic hydrogen is excited in a first step by a Doppler-free two-photon excitation at λ = 205 nm to n = 3, and fluorescence light at Balmer-α, λ = 656 nm, is observed. In a second step the atoms are further excited by a tunable infrared beam around λ = 850 nm to the Rydberg state (typically n =14 – 30). When this radiation is in resonance with a transition to a Stark shifted level, population is transferred from n = 3 to the Rydberg state, and the fluorescence at Balmer-α decreases accordingly: The spectrum is represented as a series of dips in the UV-laser. The field strength is inferred from a comparison of the measurement with calculated spectra. With this fluorescence-dip technique static fields as low as 5 V/cm can be measured[1].

The high frequency field of the microwave causes a Stark broadening which is different from the static analogon[2]. Each static Stark component is further split in a series of satellites which are separated by the microwave frequency. The maximum intensity of these so called 'Blochnizew satellites' is located close to the spectral position of the static Stark shift and a tail of satellites extends towards smaller shifts. The separation of the satellites ω = 15.4 GHz is too small to be resolved in our measurements, and an unstructured line broadening is observed.

Thus, Luggenholscher et al. measured the field strength (NOT THE BALMER WIDTH) from scanning the dip in fluorescence due to excitation of highly excited Rydberg states of H. The result was ~80 V/cm corresponding to a infrared laser scan having a width of 3.7 cm^{-1}. From Eq. (10), the corresponding line width change of the Balmer beta line (which is about that of the Balmer alpha change) due to the measured field of 80 V/cm is

$$\Delta\lambda_0[nm] = \left(1.52X10^{-3}\right)\left(8X10^{-2}\right) = 1.2X10^{-4}\,nm$$

This is why Luggenholscher et al. state (abstract) "Up to now, this low field strength was not within the reach of spectroscopic techniques for electric field measurements".

The temperature calculated from the Doppler half-width using the formula:

$$\Delta\lambda_D = 7.16\,X\,10^{-7}\lambda_0\left(\frac{T}{\mu}\right)^{1/2} \quad (nm) \qquad (2)$$

where λ_0 is the line wavelength in nm, T is the temperature in K ($1\ eV = 11{,}605\ K$), and μ is the molecular weight (=1 for hydrogen) is

$$5.6\,X\,10^{-6}\ eV$$

To further compound the Committee's clear error is the clear statement by Luggenholscher et al. (Spectroscopic Method) that the method probes Doppler free atoms: "atomic hydrogen is excited in a first step by a Doppler-free two photon excitation". Thus, the 15 eV Doppler energy claimed by the Committee from this data is completely bogus.

Regarding the "Blochnizew satellites", the Examiner is again directed to the Luggenholscher et al. paper where he will find (Spectroscopic Method) "The separation of these satellites $\omega = 15.4\ GHz$ was too small to be resolved in our measurements', and an unstructured line broadening is observed".

Thus, as correctly stated by the Applicant, the Committee is off by many orders of magnitude of the effect and the results of 0.1 to greater than 0.5 nm Balmer-line broadening (10-100 eV) can not be explained by the microwave fields. They can even be explained by fields many orders of magnitude that observed in microwave plasmas as reported by many others scientists in the above cited references.

Applicant has performed the definitive tests and shown the same extraordinary fast H in regions and cells with essentially no fields which completely eliminates all explanations based on fields as reported in the exemplary paper:

114. R. Mills, K. Akhtar, B. Dhandapani, "Tests of Features of Field-Acceleration Models for the Extraordinary Selective H Balmer α Broadening in Certain Hydrogen Mixed Plasmas", Journal of Applied Physics, submitted.

The Committee's recommendation regarding Doppler-free laser spectroscopy is not well taken. **It is unscientific to make an unsupported statement that the Doppler-free laser spectroscopic line width would be negligible in comparison to the observed broadening, since such measurement has never been actually made in**

the entire history of hydrogen line broadening anomaly. If and only if it turns out that the Doppler-free (i.e., homogenous) line width is within the conventionally known natural line width can one conclusively conclude that the observed broadening is inhomogeneous (Doppler). However, it may well turn out that the Doppler-free line width is effectively as broad as the observed line width, e.g., in the form of plasma satellites or microwave satellites (Blochinzew effect). Nevertheless, such Doppler-free laser spectroscopy is not necessary since Applicant's experimental data conclusively ruled out all of the Committee's other explanations for the broadening based on fields. If the Committee would fairly consider this experimental evidence, it would be forced to admit that it alternatives are simply not acceptable and should be withdrawn.

On page 15 of Souw Appendix A, the Committee further incorrectly states:

> (18) In section *55,* Applicant alleges that his hydrino is confirmed by a variety of experimental results.
>
> These experimental results are irrelevant to support Applicant's theory since applicant does not address the First Principle issue raised in the previous Appendix. Alleged match with experimental data from a scientifically invalid theory (GUT/CQM) based on flawed logic and physical concepts & principles, thus leading to totally arbitrary results, does not justify the theory.

Applicant has addressed the first principle issue fully and the Committee's failure to recognize this fact only shows the inattentiveness paid to Applicant's submissions. Applicant's theory is based on Maxwell's equations and first principles.

Furthermore, even if Applicant's theory is flawed—which it is not—that in and of itself is not an excuse for the Committee to simply ignore the experimental evidence of record. Applicant claims lower energy states and the experimental evidence of record supports those lower energy states. Applicant requests that the Committee fully and fairly consider the experimental evidence of record.

On pages 15-16 of Souw Appendix A, the Committee further incorrectly states:

> Furthermore, results from Applicant's own experiments that are unverified or even contradicted by other independent researchers (e.g. EarthTech, NASA, Cvetanovic at al. *(2005),* Jovicevic et al. (2004)) are not valid as scientific evidence.

Applicant has fully addressed the Earth Tech, NASA, Cvetanovic and Jovicevic references, *ad nauseum*, without an adequate rebuttal from the Committee. Further, the Committee cites no legal support giving it authority to simply ignore experimental evidence prepared by an applicant. The vast majority of chemical related patents issued over the last 50 years include experimental evidence prepared by the applicant. The Committee, in fact, required that Applicant's experimental evidence be peer-reviewed and published as a precondition to being considered. Having complied with that requirement, Applicant requests that the Committee honor its commitment to fairly consider the experimental evidence of record.

On page 16 of Souw Appendix A, the Committee further incorrectly states:

> (19) With respect to sections *56-58,* Applicant repeats arguments that have been fully addressed in the previous Appendix.
>
> In these sections, Applicant merely contradicts the Examiner's arguments. Applicant continues to misunderstand elementary wave theory.

Applicant does not "merely contradict the Examiner's arguments." Instead, Applicant points out the many errors in the Committee's reasoning, to which the Committee has no response. Applicant also submits extensive experimental evidence to support his position, which the Committee simply ignores. Instead of making baseless conclusions that have no evidentiary value, Applicant recommends that the Committee try a different approach by beginning to fully and fairly consider the experimental evidence of record.

On page 16 of Souw Appendix A, the Committee further incorrectly states:

> (20) With respect to section 59, applicant's allegation of computerized curve fitting regarding the QM theory of Condon & Shortley is based on Applicant's total misunderstanding of this classical work in physics. Condon & Shortley's formulas are all analytic, and hence, does not need any computer curve fitting. Thus, Applicant's attempt to "refute" Examiner's Appendix is groundless.

Actually, the Committee is the one that misunderstands quantum theory, as demonstrated by these arguments. Applicant's modern theory derives the closed-form equation containing fundamental constants only of all (an infinite number) of the

lifetimes of one-electron atoms. This can not be matched by outdated quantum theory.

Once again, the results given in Condon and Shortley do not match the experimental data and violate the constant maximum speed of light for the electron velocity as well as other violations of physical laws as discussed in Mills GUT, Chp 2. As discussed in footnote 4, the mathematics of Condon and Shortly is not internally consistent. Rather it is chosen to force a result. There is no first-principles derivation that is internally consistent. This is equivalent to curve fitting to force a match with known experimental results. But, even with this clear curve-fitting, outdated quantum theory fails since the results do not match the NIST data. The Committee's failure to rebut these and other arguments presented by Applicant are telling.

On page 16 of Souw Appendix A, the Committee further incorrectly states:

> (22) In section 61, applicant does not argue against Examiner's refutation of Applicant's GUT based on mathematical flaws and conceptual errors as recited in the original Souw Appendix. Consequently, those flaws and errors stand unrefuted.

Applicant has fully rebutted the Committee's arguments in Section 61 with detailed analysis. Thus, the so-called "flaws" and "errors" referred to by the Committee have been refuted completely. It is Applicant's arguments and evidence that stand unrefuted.

On page 16 of Souw Appendix A, the Committee further incorrectly states:

> Instead, Applicant attacks the Feynman and Heisenberg principle in SQM using mathematically flawed and conceptually erroneous arguments.

Applicant does not attack the Feynman and Heisenberg principle. Rather, Applicant methodically points out the blatant errors in the Feynman and Heisenberg principle, to which the Committee has not responded.

On page 17 of Souw Appendix A, the Committee further incorrectly states:

> (23) With respect to section 62, the erroneous point source basis of Applicant's GUT has been addressed in the original Souw Appendix, which stands unrefuted, because Applicant's response is a mere contradiction without any counter-argument.

Applicant is astonished at the extremes to which the Committee is willing go to

mischaracterize his lower-energy technology. For the past 15 years, Applicant has clearly stated his theory holds that the election is **NOT** a point particle. Outdated quantum theory wrongly views the electron as a point particle. For the Committee to continue to argue that Applicant's modern theory involves a point particle is absurd and undercuts it entire analysis of Applicant's technology.

Applicant has even gone so far as to provide the Committee with detailed pictures of his electron spheres, which are easily distinguished from the point particle electrons of outdated quantum theory. Thus, there is no legitimate excuse the Committee can use to argue that Applicant's modern theory requires that the electron be a point particle.

On page 17 of Souw Appendix A, the Committee further incorrectly states:

> Unrefuted is also the Examiner's demonstration given in the original Souw Appendix that Applicant's derivation of density function is mathematically wrong and conceptually incorrect while also being in contradiction with Haus's theory.
>
> (24) With respect to section 63, applicant does not argue that the Examiner's proof in the previous Souw Appendix that Applicant's analysis based on Haus theorem is mathematically and physically flawed. Instead of addressing the Examiner's argument,, Applicant attacks the conventional QM (Quantum Mechanics).

Applicant did not merely attack outdated quantum theory (QM) as alleged by the Committee. Rather, Applicant provided 15 pages of detailed analysis showing how the Committee's argument is wrong and how Applicant's theory is correct and experimentally proven. The Committee has not refuted even one statement made by Applicant in these 15 pages, which speaks for itself.

On page 17 of Souw Appendix A, the Committee further incorrectly states:

> (25) With respect to section 64, Applicant's mere allegation of "not having even a basic understanding" without ever refuting the mathematically and physically sound demonstration of the original Souw Appendix is not persuasive. The original Souw Appendix stands therefore unrefuted.

Applicant fully rebutted each point raised by the Committee in detail. As stated previously, Applicant's theory has consistently held that the n=1 state does NOT radiate. For the Committee to argue otherwise demonstrates its basic lack of

understanding Applicant's theory. Applicant's arguments and experimental evidence stand unrefuted.

On page 17 of Souw Appendix A, the Committee further incorrectly states:

> (26) With respect to section 65, Laloe's comments on SQM is philosophical, which is totally irrelevant to the real world, as already recited in the original Souw Appendix. Philosophical dispute is even more irrelevant for patent examination procedure, since philosophy belongs to non-statutory subject matter.

Applicant cited the Laloe article merely to point out the many flaws in the outdated quantum theory to which the Committee so desperately clings. Instead of refuting the points raised by the Laloe article, the Committee simply ignores them as it has ignored the extensive experimental evidence of record.

On page 18 of Souw Appendix A, the Committee further incorrectly states:

> (27) With respect to section 66, applicant's recitation "other theoreticians, such as those at Princeton University" is unpersuasive, since it does not recite any name, or any scientific work other than Applicant's own paper(s), all of which having been determined invalid as support in this instant application.

Applicant cited Lieb and Bugliaro as examples of "other theoreticians" who reject outdated quantum theory. These "other theoreticians" have not been cited to support Applicant's theory, but rather to point out the many flaws of quantum theory. In this respect, these points stand unrebutted.

On page 18 of Souw Appendix A, the Committee further incorrectly states:

> Applicant's tentative recitation of E.H. Lieb's article is flawed and also misleading, since Lieb does not mention anything about hydrino. The fact that SQM contains parts that need improvement is scientifically acceptable, since (a) no physical theory is all encompassing, and (b) there would otherwise be no progress in science.

This latest double standard by the Committee further exposes the weakness of its case. When it comes to the flawed and outdated quantum theory, upon which the Committee relies so heavily to support its position, the fact that it needs improvement is "scientifically acceptable." Yet, the Committee requires that Applicant's modern and more advanced theory that accurately predicts the existence of lower energy states be

perfect in every detail—which it is—before it will deem Applicant's experimental evidence credible and, thus, worthy of consideration. This clear double standard make a mockery of the Committee's rejections in this case.

How can the Committee on the one hand admit that outdated quantum theory "needs improvement" and then seriously claim on the other that this flawed theory is a legitimate basis for asserting Applicant's modern theory, which accurately predicts lower energy states, is "incredible." This unsustainable, flawed position sounds the death knell for the Committee's rejections in this case, which should be withdrawn immediately.

On page 18 of Souw Appendix A, the Committee further incorrectly states:

> In comparison, the GUT is unacceptable, simply because it is mathematically flawed and in contradiction with the existing physical laws, as described in the original Souw Appendix.

The Committee has not cited even one single law that Applicant's theory violates, nor can it. That is because Applicant's theory is based on classical laws, such as Maxwell's equations, which led to the predicted lower energy states. In contrast, outdated quantum theory is not based on such laws and, indeed, violates many of them as argued by Applicant previously, which arguments stand unrefuted by the Committee. Yet the Committee elevates this outdated quantum theory that "needs improvement" to the status of "scientific principle" and uses that as the primary excuse for ignoring Applicant's real-world evidence. Indeed, Applicant has been told that his evidence is being ignored because it detracts from the central issue that quantum theory forbids the existence of lower energy states. This absurd position taken by the Committee, like the multiple dimensions of quantum theory, has no basis in law or reality.

On page 18 of Souw Appendix A, the Committee further incorrectly states:

> (28) With respect to section 67, contrary to Applicant's assertions, the scientific community agrees with Feynman and Lieb, both being consistent and coherent with the Heisenberg's Uncertainty Principle. Thus, Applicant's argument is unpersuasive.

The Committee's unsubstantiated conclusion that the "scientific community agrees with Feynman and Lieb" is not evidence and does not even begin to repair the

many flaws in outdated quantum theory pointed out by Applicant. Applicant requests that the Committee respond to the arguments raised by Applicant and present real evidence, as opposed to mere conclusions, and if it has no real evidence, that it withdraw the rejections of record.

On page 18 of Souw Appendix A, the Committee further incorrectly argues:

> Applicant's reference to the Buliaro et al. article is unpersuasive, because, also like Feynman and Lieb, the Buliaro et al. the article does not recite hydrino.

This argument, like so many others, demonstrates the bankruptcy of the Committee's position. Applicant did not cite Bugliaro to support hydrino. Rather, as clearly stated by Applicant, the Bugliaro article was cited to point out the many flaws in outdated quantum theory, which evidence stands unrefuted.

On page 18 of Souw Appendix A, the Committee further incorrectly states:

> (29) With respect to section 68, applicant's allegation that the correspondence principle (CP) is incorrect, is against the conventional understanding of physics, as known to those ordinarily skilled in the art, and hence, unpersuasive.

Whether or not the correspondence principle is conventional has no bearing on its accuracy. Applicant has provided persuasive arguments as to why the correspondence principle is wrong, which stand unrefuted by the Committee.

On pages 18-19 of Souw Appendix A, the Committee further incorrectly states:

> (30) With respect to section 69, applicant's allegation that "the Examiner's error is confirmed by other physicists" is unfounded, because (a) no physicist is named, nor is any article quoted by Applicant . . .

Applicant provided five pages of detailed arguments with citations to peer-reviewed publications that conclusively demonstrate the error made by the Committee. These arguments stand unrebutted.

On page 19 of Souw Appendix A, the Committee further incorrectly states:

> (b) Applicant's allegation is merely a contradiction, not an argument, for failing to present any counter-argument against Examiner's facts that has been thoroughly demonstrated in the original Souw Appendix regarding formulas (1.59) to (1.68) and Eq.(I) to *(5)* of Applicant's GUT.

Again, Applicant provided five pages of detailed arguments with numerous citations to published articles in direct "counter-argument" against the Committee's points. The Committee has failed to rebut those arguments.

On page 19 of Souw Appendix A, the Committee further incorrectly states:

> (31) With respect to section 70, applicant's citation of his own papers against the Dirac's theory is unpersuasive, since the Dirac's theory is well accepted by the scientific community and mathematically sound (P.A.M. DIRAC, NOBEL PRIZE IN PHYSICS, 1933, FOR THE DISCOVERY OF NEW PRODUCTIVE FORMS OF ATOMIC THEORY), whereas Applicant's GUT/CQM underlying Applicant's cited papers has been proven wrong, for reasons stated in the original Souw Appendix, which stands unrefuted. Therefore, Applicant's arguments against the Dirac theory remains unpersuasive.

Whether Dirac received a Nobel prize or not has no bearing on the accuracy of his theory. Applicant provided eight pages and nine articles showing in detail the flaws of Dirac's theory, and the Committee has not come up with one shred of evidence in rebuttal.

On page 19 of Souw Appendix A, the Committee further incorrectly states:

> (32) With respect to section 71, applicant's has failed to provide a mathematical proof as requested by the Examiner, i.e., that Applicant's electron density function does satisfy Applicant's own wave equation. Applicant's inability to provide mathematical proof illustrates just one of the numerous mathematical flaws and conceptual errors in GUT/CQM, as addressed in detail in the original Souw Appendix.

Applicant requested that the Committee cite a LAW that he must satisfy, and the Committee failed to provide such. Applicant's theory accurately models the electron, atoms, ions and molecules, and the Committee has failed to show otherwise.

On page 19 of Souw Appendix A, the Committee further incorrectly states:

> (33) With respect to section 72, Applicant's use of McQuarrie's formula for rigid-rotator has been proven incorrect in the 05/23/2005 Appendix.

In Section 72, Applicant again requested that the Committee cite a LAW to support its position, which the Committee failed to do. The Committee's latest assertion that it has supposedly proven Applicant's use of the rigid-rotator formula wrong is

absurd. Applicant has provided clear evidence that his use of the rigid-rotator formula is correct, which has not been refuted. The Committee's mere conclusions do not amount to evidence.

On pages 19-20 of Souw Appendix A, the Committee further incorrectly states:

> Since McQuarrie' s formula itself has been proven by the Examiner as being consistent with the conventional SQM, Applicant's error shows that Applicant has misunderstood his own reference, thus disqualifying Applicant's entire argument. Thus, not only is Applicant's argument unpersuasive, it is not even a valid argument, but only a mere contradiction against Examiner's mathematical proof, without presenting any counter-argument and/or mathematical counter-proof. Therefore, Applicant's insistence that his 3-function does not need to satisfy —or must not be a solution of-- the wave equation, is here reconfirmed as being a violation of the basic laws of physics and mathematics.

Once again, Applicant requests that the Committee identify even a single LAW, instead of nebulous references to "basic laws of physics and mathematics." Applicant's theory is based on the laws of classical physics, namely Maxwell's equations. Without identifying the law Applicant's theory supposedly violates, the Committee exposes the hollowness of its arguments.

On page 20 of Souw Appendix A, the Committee further incorrectly states:

> Applicant states on page 130 in the appendix filed on 5/23/2005 in U.S. Serial No. 09/669,877 that "[t]he Examiner's comment about Applicant's argument being 'unpersuasive because Applicant's response contradicts the mathematical requirement that any valid solution must satisfy the generic equation' is not well taken. On which physical law is this statement by the Examiner based?"
>
> In response to Applicant's contention, the Examiner's statement is based on one of the fundamental principles of mathematics where a function must solve the equation in order for it to qualify as and be called a solution of the equation.

Applicant requested that the Committee identify a LAW that is supposedly being violated, not a "fundamental principle." Furthermore, Applicant has shown in detail how his theory if based on classical laws using CLOSED FORM EQUATIONS. Applicant's functions solve the equations and the Committee has not shown otherwise.

Further, another mistake the Committee continues to make is the wrongful belief

that the bound electron must be a solution of a three-dimensions (no time) point-particle-probability wave equation for the energy. **There is no such law**. In fact, the Committee's concern is misplaced. Arguing the correctness of mathematics is irrelevant. There exist infinite correct mathematics that have no connection to reality. The outdated quantum theory the Committee clings to has the physics wrong and is fatally flawed since the physics of an all-space-point-particle-probability wave is nonsensical because it violates all fundamental principles including conservation of energy, momentum, causality, and is not stable to radiation as discussed in the articles:

1. R. L. Mills, "Classical Quantum Mechanics", Physics Essays, Vol. 16, No. 4, December, (2003), pp. 433-498; posted with spreadsheets at http://www.blacklightpower.com/techpapers.shtml.
2. R. Mills, "Physical Solutions of the Nature of the Atom, Photon, and Their Interactions to Form Excited and Predicted Hydrino States", submitted.
3. R. L. Mills, "Exact Classical Quantum Mechanical Solutions for One- Through Twenty-Electron Atoms", in press, posted with spreadsheets at http://www.blacklightpower.com/techpapers.shtml.
4. R. L. Mills, "The Nature of the Chemical Bond Revisited and an Alternative Maxwellian Approach", Physics Essays, Vol. 17, (2004), pp. 342-389, posted with spreadsheets at http://www.blacklightpower.com/techpapers.shtml.
5. R. L. Mills, "Maxwell's Equations and QED: Which is Fact and Which is Fiction", in press, posted with spreadsheets at http://www.blacklightpower.com/techpapers.shtml.
6. R. L. Mills, "Exact Classical Quantum Mechanical Solution for Atomic Helium Which Predicts Conjugate Parameters from a Unique Solution for the First Time", submitted, posted with spreadsheets at http://www.blacklightpower.com/techpapers.shtml.
7. R. L. Mills, "The Fallacy of Feynman's Argument on the Stability of the Hydrogen Atom According to Quantum Mechanics," Annales de la Fondation Louis de Broglie, Vol. 30, No. 2, (2005), pp. 129-151; posted at http://www.blacklightpower.com/theory/theory.shtml.
8. R. Mills, "The Grand Unified Theory of Classical Quantum Mechanics", Int. J. Hydrogen Energy, Vol. 27, No. 5, (2002), pp. 565-590.
9. R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183.
10. R. Mills, The Nature of Free Electrons in Superfluid Heliumóa Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory, Int. J. Hydrogen Energy, Vol. 26, No. 10, (2001), pp. 1059-1096.
11. V. F. Weisskopf, Reviews of Modern Physics, Vol. 21, No. 2, (1949), pp. 305-315.
12. P. Pearle, Foundations of Physics, "Absence of radiationless motions of relativistically rigid classical electron", Vol. 7, Nos. 11/12, (1977), pp. 931-945.

13. A. Einstein, B. Podolsky, N. Rosen, Phys. Rev., Vol. 47, (1935), p. 777.
14. F. Laloe, Do we really understand quantum mechanics? Strange correlations, paradoxes, and theorems, Am. J. Phys. 69 (6), June 2001, 655-701.

Furthermore, there is no flaw in the Applicant's mathematics or physics. Applying the constraint of nonradiation to the three-dimension wave equation plus time as an equation of motion reveals that any motion in the third (radial) dimension results in radiation; thus, the two dimensional wave equation plus time is solved to be consistent with physical laws as given in Mills GUT and 113.R. Mills, "Physical Solutions of the Nature of the Atom, Photon, and Their Interactions to Form Excited and Predicted Hydrino States", New Journal of Physics, submitted.

On page 20 of Souw Appendix A, the Committee further incorrectly states:

> (34) With respect to section 73, applicant's interpretation of Haus's radiation condition has been demonstrated in the original Souw Appendix as being inconsistent with Haus' s theory, and the corresponding derivation in Applicant's GUT also has been proven as mathematically flawed, and hence, invalid as counter-argument.

Applicant previously stated that as shown in Section 63 above and GUT Chp. 1 [Ref. #1], the condition of nonradiation requires that the three-dimensional wave equation plus time be reduced to the two-dimensional wave equation plus time. This equation IS rigorously solved for 100's of observables with remarkable agreement between predicted and experimental values. This evidentiary showing stands unrefuted by the Committee.

On pages 20-21 of Souw Appendix A, the Committee further incorrectly states:

> Applicant's claim of "rigorously solved" is unsupported by the facts in the record, since Applicant has failed to provide the rigorous proof so far requested by the Examiner, i.e., that Applicant show that Applicant's solution for electron density function is a valid solution of the corresponding wave equation which Applicant has not done so.

Applicant has provided detailed mathematical proof that his theory is accurate. The accuracy of Applicant's theory is further evidenced by its prediction of lower energy states, which were subsequently confirmed by experimental evidence. In contrast, outdated quantum theory, which the Committee admits "needs improvement," forbids

these lower energy states and, thus, does not conform with modern, real-world experimental evidence.

On page 21 of Souw Appendix A, the Committee further incorrectly states:

> *(35)* With respect section 74, as already shown in the original Souw Appendix, Applicant's angular momentum wavefunctions have been mathematically proven incorrect.

The experimental evidence ignored by the Committee proves that Applicant's theory is mathematically sound. Applicant's angular functions are charge-density waves that describe real charge moving in space and time. They do not refer to the weird probability-density functions of outdated quantum mechanics that are nonphysical. Applicant's modern theory matches the experimental data exactly. The Committee has not shown how these equations are supposedly incorrect or otherwise refute Applicant's compelling evidence.

On page 21 of Souw Appendix A, the Committee further incorrectly states:

> Furthermore, Applicant's derivation of angular momentum functions using McQuarrie's formula for rigid-rotator also has been proven incorrect in the last 05/23/2005 Appendix.

In sections 84-85 of his previous response, Applicant presented evidence showing how the Committee's reasoning was flawed, which evidence stands unrefuted. Furthermore, the experimental evidence ignored by the Committee supports the mathematical accuracy of Applicant's theory, which accurately predicted lower energy states.

On page 21 of Souw Appendix A, the Committee further incorrectly states:

> On the other hand, it has been also proven by the Examiner that McQuarrie's formula is consistent with the conventional SQM. Thus, Applicant's mistake shows that Applicant has misunderstood his own reference, and disqualifies Applicant's entire arguments. Consequently, the Examiner's refutation of Applicant's angular momentum wave functions, as well as the Examiner's judgment that Applicant's misunderstands the SQM, are here reconfirmed.

This simply is not true. In sections 84-85 and other sections of his previous response, Applicant provides detailed arguments showing how the Committee's

reasoning is flawed, which arguments stand unrefuted.

On page 21 of Souw Appendix A, the Committee further incorrectly states:

> Applicant's further citation of his own papers is unpersuasive evidence, since all those papers are based on a flawed theory (GUT) not supported by any experimental evidence, and hence, they all have been disqualified as support in this prosecution.

Applicant's publications have been exhaustively peer-reviewed, as requested by the Committee. It is unfair for the Committee to now simply ignore these publications. Furthermore, most of Applicant's publications are supported by experimental evidence. Applicant requests that the Committee honor the standards it established and fairly consider Applicants evidence presented in his published articles.

On page 21 of Souw Appendix A, the Committee further incorrectly states:

> (36) With respect to section *75,* applicant's claim that GUT or CQM "unifies Maxwell's equations, special and general relativity with atomic physics" is scientifically unfounded, since it has been demonstrated in the original Souw Appendix, as well as in the follow-up Appendices, that Applicant's CQM is in direct violation of Maxwell's equations, special and general relativity and atomic physics. Therefore, Applicant's assertion is a mere contradiction of Examiner's extended proofs, without giving any counter-proofs.

The Committee has not shown how Applicant's modern theory supposedly violates Maxwell's equations, or special and general relativity. In contrast, Applicant has clearly shown how outdated quantum theory violates classical laws. Applicant's arguments and evidence in Section 75 thus stands unrefuted.

On page 22 of Souw Appendix A, the Committee further incorrectly states:

> Applicant's additional arguments regarding "top-quark" and "fundamental particles" are recited out of context and must be deemed incredible, since Applicant has totally failed to argue against the main issues in Examiner's refutation, as brought up in the original Souw Appendix as well as the follow-up Appendices. Consequently, the Examiner's judgment regarding Applicant's violations of Maxwell's equations, special and general relativity and atomic physics, is herewith reconfirmed.

In section 116, Applicant provided detailed arguments regarding the "top-quark" and "fundamental particles," which stand unrefuted by the Committee.

On page 22 of Souw Appendix A, the Committee further incorrectly states:

> (37) With respect to section 76, applicant's attack against SQM is misplaced as well as misleading since it totally misses the Examiner's point, i.e., that "there are plenty of a *priori* basis for a theory to be incorrect, i.e., if the theory is incredible, illogical, and/or self-contradictory, such as GUT or CQM". Therefore, Applicant's argument is deemed unpersuasive, and hence, the CQM stands incredible, illogical, and/or self-contradictory, as already brought up in the original Souw Appendix and in the following Appendices, which are herewith reconfirmed.

Applicant has put forth detailed arguments showing that outdated quantum theory is incredible, illogical and self-contradictory, to which the Committee has no response. Likewise, the Committee has yet to address, much less refute, the detailed arguments and extensive experimental evidence showing that Applicant's modern theory represents the real-world, is logical, and consistent with that evidence.

On page 22 of Souw Appendix A, the Committee further incorrectly states:

> Instead of adequately defending against Examiner's arguments, Applicant attacks SQM by predicting alleged "infinities" without any proof, thereby revealing Applicant's own misunderstanding of the most elementary foundations of physics. Consequently, Applicant's unsupported assertions regarding Maxwell and Einstein's Relativity theories are not given further consideration.

The Committee's statements regarding "Maxwell and Einstein's Relativity theories are not given further consideration" is telling and consistent with the Committee's refusal to further consider the extensive experimental evidence of record.

Applicant provided detailed arguments and citations to publications to support his statement that outdated quantum theory is internally inconsistent, does not represent the real world, and predicts "infinities." Applicant clearly showed how infinities arise in Dirac's equations in section 63 of his previous response, which showing stands unrefuted.

On page 22 of Souw Appendix A, the Committee further incorrectly states:

> (38) With respect to section 77, Applicant's comments regarding demonstrated deficiencies of CQM is a mere contradiction without any counter-argument.

Applicant provided counter-arguments showing in detail how the outdated

quantum theory is mathematically and conceptually inconsistent, contains self-contradictions, and otherwise mathematical flawed, which showing stands unrefuted. The Committee's own admissions that flawed quantum theory "needs improvement" provides further support to Applicant's case.

On page 23 of Souw Appendix A, the Committee further incorrectly states:

> (40) With respect to section 79, applicant's misunderstanding of the correct definition of current density in applying the Haus's condition remains factually unrefuted for reasons given in the previous appendices. Consequently, Applicant's formal and conceptual mistake in handling the Haus's radiation condition is herewith confirmed.

Applicant provided a detailed response demonstrating that he correctly considered the vector aspect of the current. In the paper 58. R. L. Mills, "Classical Quantum Mechanics", Physics Essays, in press, appears:

The current due to the time dependent term is

$$\begin{aligned}
\mathbf{J} &= \frac{\omega_n}{2\pi}\frac{e}{4\pi r_n^2} N[\delta(r-r_n)]\,\mathrm{Re}\left\{Y_\ell^m(\theta,\phi)\right\}[\mathbf{u}(t)\times\mathbf{r}] \\
&= \frac{\omega_n}{2\pi}\frac{e}{4\pi r_n^2} N[\delta(r-r_n)]\,\mathrm{Re}\left\{Y_\ell^m(\theta,\phi)e^{i\omega_n' t}\right\}[\mathbf{u}\times\mathbf{r}] \\
&= \frac{\omega_n}{2\pi}\frac{e}{4\pi r_n^2} N'[\delta(r-r_n)]\,\mathrm{Re}\left(P_\ell^m(\cos\theta)e^{im\phi}e^{i\omega_n' t}\right)[\mathbf{u}\times\mathbf{r}] \\
&= \frac{\omega_n}{2\pi}\frac{e}{4\pi r_n^2} N'[\delta(r-r_n)]\left(P_\ell^m(\cos\theta)\cos\left(m\phi+\omega_n' t\right)\right)[\mathbf{u}\times\mathbf{r}] \\
&= \frac{\omega_n}{2\pi}\frac{e}{4\pi r_n^2} N'[\delta(r-r_n)]\left(P_\ell^m(\cos\theta)\cos\left(m\phi+\omega_n' t\right)\right)\sin\theta\hat{\phi}
\end{aligned} \tag{21}$$

where to keep the form of the spherical harmonic as a traveling wave about the z-axis, $\omega_n' = m\omega_n$ and N and N' are normalization constants. The vectors are defined as

$$\hat{\phi} = \frac{\hat{u}\times\hat{r}}{|\hat{u}\times\hat{r}|} = \frac{\hat{u}\times\hat{r}}{\sin\theta}; \qquad \hat{u} = \hat{z} = orbital\ axis \tag{22}$$

$$\hat{\theta} = \hat{\phi}\times\hat{r} \tag{23}$$

"^" denotes the unit vectors $\hat{u} \equiv \frac{\mathbf{u}}{|\mathbf{u}|}$, non-unit vectors are designed in bold, and the current function is normalized.

This evidentiary response stands unrefuted by the Committee.

On page 23 of Souw Appendix A, the Committee further incorrectly states:

> (41) With respect to section 80, applicant's failure to argue against his mistake regarding the density δ-function has been sufficiently discussed in the previous sections 74 and 76, and hence, will not be addressed herein. Furthermore, these two sections also disclose Applicant's failure to understand his own McQuarrie reference.

In sections 63, 73 and 80 of his previous response, Applicant discussed in detail the charge density functions that are solutions of the two-dimensional wave equation plus time. This argument stands unrefuted by the Committee.

On page 23 of Souw Appendix A, the Committee further incorrectly states:

> (42) With respect to section 81, applicant's claim of a "successful application of special relativity" is a mere contradiction without any support against a mathematical exposition of Applicant's misunderstanding and mis-application laid open by the Examiner in the original Souw Appendix.

Applicant provided detailed reasoning showing the "successful application of special relativity" in section 81 of his previous response, which stands unrefuted by the Committee.

On page 23 of Souw Appendix A, the Committee further incorrectly states:

> (43) With respect to sections 82-83, applicant's response confirms Applicant's misunderstanding of eigenfunctions and wave functions, since Applicant's angular momentum functions are wave functions, not eigenfunctions of the angular momentum operator, as already brought up in the original Souw Appendix.

Applicant pointed out previously that he understands that the basic function sinwt is an eigenfunction; others may be more complicated, but the distinguishing feature is that the derivative is a constant times the function.

Applicant made the point in a prior Response that a sum of eigenfunctions is an eigenfunction, which stands unrefuted. It is irrelevant that SQM requires that the eigenfunctions be square integrable, which is the original argument that the Committee is diverting from. The Committee admits that linear combinations of eigenfunctions do not work in SQM since SQM is not a theory based on physics. It is nonsensical to square a probability-wave function to get a charge or mass function. In contrast, in Applicant's CQM the electron states comprise the sum of a constant charge-density function corresponding to spin angular momentum and a spherically-

and time-harmonic function that modulates the constant function and corresponds to orbital angular momentum. This eliminates the failures of SQM in providing a current corresponding to spin, the lack of degenerate orbital angular levels in the absence of a magnetic field, and other failings as reported previously in the literature:

17. R. Mills, "The Nature of Free Electrons in Superfluid Helium--a Test of Quantum Mechanics and a Basis to Review its Foundations and Make a Comparison to Classical Theory", Int. J. Hydrogen Energy, Vol. 26, No. 10, (2001), pp. 1059-1096.
5. R. Mills, "The Hydrogen Atom Revisited", Int. J. of Hydrogen Energy, Vol. 25, Issue 12, December, (2000), pp. 1171-1183.
1. R. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, September 2001 Edition, BlackLight Power, Inc., Cranbury, New Jersey, Distributed by Amazon.com; January 2005 Edition posted at www.blacklightpower.com.

This evidence stands unrefuted by the Committee.

On page 23-24 of Souw Appendix A, the Committee further incorrectly states:

> Furthermore, not only is Applicant's renewed attack against SQM unjustified, but more importantly, it is without support. Applicant's citation of his own papers is unpersuasive, since such papers is based on flawed mathematics and conceptual errors, and have been thus disqualified as support in this prosecution.

Again, Applicant has not "attacked" quantum theory, but rather only shown in detail its many flaws. Applicant takes exception with the Committee's persistence in trying to lay the many flaws of quantum theory on Applicant's theory. Applicant's theory takes into account modern experimental data, whereas outdated quantum theory, which the Committee admits "needs improvement," does not.

Applicant also takes exception to the Committee's baseless allegation that Applicant's papers are based on nebulous "flawed mathematics and conceptual errors." Applicant requests that the Committee put aside its biased penchant for outdated quantum theory so that it can fairly consider Applicant's experimental evidence.

On page 24 of Souw Appendix A, the Committee further incorrectly states:

> (44) With respect to sections 84, *85,* 88, 89, and 93, applicant's failure of persuasively arguing his misunderstanding of his own reference,

> McQuarrie, as demonstrated in the 05/23/2005 Appendix, has been adequately discussed in previous sections 74 and 76, and hence will not be addressed herein. It is important to emphasize, Applicant's misunderstanding of his own reference, as demonstrated in the last Appendix, ultimately disqualifies Applicant's entire arguments regarding the subject matter of Quantum Mechanics (QM or SQM).

Applicant has put forth detailed arguments and evidence showing that he correctly uses McQuarrie, which the Committee does not rebut. The Committee's mere conclusory statements are not evidence. Rather that trying to "disqualify" Applicant's arguments and evidence, the Committee is well advised to consider them fully.

On page 24 of Souw Appendix A, the Committee further incorrectly states:

> Applicant's renewed attack on SQM by citing a new reference (Fowles, referring to section 84), as well as Applicant's own papers (sections 85 and 88), is not only misplaced but also unpersuasive, for being based on Applicant's misunderstanding of the SQM fundamentals, as already brought up in the original Souw Appendix and the following ones.

The Committee admits that the reference Fowles and Applicant's papers in sections 85 and 88 are new. Thus, it is impossible that past allegations made by the Committee could have fully addressed them. Applicant once again requests that the Committee fully and fairly consider Applicant's evidence.

On page 24 of Souw Appendix A, the Committee further incorrectly states:

> Applicant's attacks on SQM do not change the fact that Applicant's GUT/CQM does not agree with physical laws and mathematical principles.

Again, Applicant requests that the Committee identify a single LAW that he is violating. The Committee continues to confuse outdated quantum theory, which does violate laws and mathematical principles, with Applicant's theory, which is based on, and therefore consistent with, classical laws and mathematical principles.

On page 24 of Souw Appendix A, the Committee further incorrectly states:

> *(45)* With respect to section 86, Applicant's removal of 'V_{00} from his basis set is well documented in Applicant's main reference (GUT); as such, Applicant's mistake in removing Y_{00} out of the complete set of angular momentum eigenfunctions is clearly evident in the record.

Applicant clearly pointed out that he does **not** take Y0,0 out, as shown in Section 84 above and Chp 1 of Mills GUT, **while outdated quantum theory does**. It has no rotational energy corresponding to spin angular momentum; yet, it has infinite energy in the electron's magnetic moment of a Bohr magneton. The Committee's error shows a clear pattern of confusing the many mathematical flaws of outdated quantum theory with the mathematically sound theory of Applicant.

On pages 24-25 of Souw Appendix A, the Committee further incorrectly states:

> Applicant's counter-attack on SQM is totally misplaced and unpersuasive, since SQM does not contain this fundamental mathematical error that is present in Applicant's theory.

Once again, outdated quantum theory does not account for Y0,0, whereas Applicant's modern theory does account for Y0,0. This is but one of the fundamental differences between Applicant's theory and quantum theory that the Committee fails to grasp.

On page 25 of Souw Appendix A, the Committee further incorrectly states:

> (46) With respect to section 87, the SQM is fully consistent with the Heisenberg Uncertainty Principle, whereas Applicant's CQM has been proven inconsistent, and hence, incorrect. Applicant's renewed attack on SQM based on Applicant's own invalid paper does rectify the insufficiencies of Applicant's CQM.

The Committee merely states that R. L. Mills, "The Fallacy of Feynman's Argument on the Stability of the Hydrogen Atom According to Quantum Mechanics," Annales de la Fondation Louis de Broglie, Vol. 30, No. 2, (2005), pp. 129–151 is invalid without providing any further basis. This paper has been exhaustively peer-reviewed and published, and thus must be accorded the credibility had by published articles. Applicant requests that the Committee fairly consider this publication in conformance with the standards that it created in requiring the publication of Applicant's confidential experimental evidence.

On page 25 of Souw Appendix A, the Committee further incorrectly states:

> (47) With respect to section 90, contrary to Applicant's assertions, the SQM is widely acknowledged as being the most successful theory in the entire history of physics. On the other hand, Applicant's GUT/CQM has not received even a single acknowledgement from the scientific

> community; and most importantly for this prosecution, it has been proven wrong in the original Souw Appendix and confirmed by all following Appendices.

Applicant has shown in great detail the falsity of the claim that quantum theory is "the most successful theory in the entire history of physics." It is an embarrassment to the U.S. Patent Office that it would allow the Committee to elevate such a flawed theory above real-world experimental evidence to excuse it from considering that evidence. Most telling is that this supposed "successful theory" fails to take into account modern experimental evidence showing the existence of lower energy states. Quantum theory is clearly outdated and, more than "needs improvement" as the Committee admits, it should be entirely scrapped in favor of Applicant's modern and more advanced theory, which fully accounts for lower energy states.

On page 25 of Souw Appendix A, the Committee further incorrectly states:

> None of the demonstrated mistakes in Applicant's theory has been successfully argued by Applicant. Therefore, CQM is rejected as a valid basis for any of Applicant's experiment.

The Committee has shown no such mistakes. Applicant has shown his theory to be mathematically accurate and in compliance with all laws, whereas outdated quantum theory is not. While Applicant's experimental evidence speaks for itself, independent of his theory, that experimental evidence clearly proves the existence of lower energy states consistent with that modern theory and further demonstrates that quantum theory is outdated. Applicant repeats his request that the Committee fairly consider that evidence.

On page 25 of Souw Appendix A, the Committee further incorrectly states:

> (48) With respect to sections 91, 92, and 94, the use of Pauli wave functions is well established in physics. The Pauli wave functions are mathematically correct and also supported by a large number of experimental measurements (including Examiner's own works/publications).

Applicant provided seven pages of detailed arguments, which stand unrefuted by the Committee. Further, Committee leader, BMS President Souw, demonstrates his inability to impartially judge Applicant's arguments and evidence since his misplaced

views are based on his "own works/publications." As discussed in the main body of this Response, the conflict laws are in place precisely because it is impossible for one to be unbiased in evaluating their own work.

On pages 25-26 of Souw Appendix A, the Committee further incorrectly states:

> On the other hand, Applicant's GUT/CQM is full of mathematical flaws and conceptual errors, as explained up in the original Souw Appendix and all the following Appendices, without Applicant ever being able to present a single persuasive counter-argument.

Once again, the Committee confuses the numerous mathematical flaws of outdated quantum theory with Applicant's mathematically sound theory. Applicant provided detailed persuasive evidence in the form of 65 published articles, which the Committee largely ignores.

On page 26 of Souw Appendix A, the Committee further incorrectly states:

> Applicant's failure of persuasively arguing his grave misunderstanding of his own reference, McQuarrie, as demonstrated in the 05/23/2005 Appendix, has been thoroughly discussed in previous sections 72, 74, 76, 84, *85,* 88, 89 and 93. Therefore, they do need to be repeated again.

Applicant provided numerous pages of detailed arguments and experimental evidence, which the Committee ignores. Simply arguing that Applicant's arguments are unpersuasive is not rebuttal evidence and most certainly fails to meet the Committee's burden of showing non-enablement or lack of utility.

On page 26 of Souw Appendix A, the Committee further incorrectly states:

> However, it is here important to emphasize, that Applicant's misunderstanding of his own reference, as demonstrated in the last Appendix, ultimately disqualifies Applicant's entire arguments regarding the subject matter of Quantum Mechanics.

This argument is totally devoid of any logic. The Committee has not shown how Applicant misunderstands his own reference. In contrast, Applicant has shown in great detail how the Committee misunderstands and misstates both its own outdated quantum theory and Applicant's theory, to which the Committee has no response.

Applicant further finds it ironic that Dr. Souw, who as the current president of a competing company, with a clear business conflict, should himself be disqualified from

leading the examination of Applicant's cases on behalf of the Committee, has the audacity to claim that any of Applicant's arguments should be disqualified in this case.